Meteors;

OR, Adams 8.674.

A plain Description of all kind of *Meteors*, as well *Fiery* and *Ayrie*, as *Watry* and *Earthy*:

BRIEFLY

Manifesting the *Causes* of all *Blazing-Stars*, *Shooting-Stars*, *Flames in the Aire*, *Thunder*, *Lightning*, *Earthquakes*, *Rain*, *Dew*, *Snow*, *Clouds*, *Springs*, *Stones*, and *Metalls*.

By *W. F.* Doctor in Divinity.

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To the Reader.

I Shall not beg your pardon for publiſhing this Book; for as 'tis none of mine (being written by a famous and learned Divine) ſo I do not ſet it forth relying on my own judgement, but had the opinions and approbation of divers perſons of known abilities, who knew beſt what is moſt uſefull for publique Benefit. And I may (without breach of Modeſty) affirm, that there is not in our Language any Book of ſo ſmall a bulke,

contains ſo much of the Doctrine of the Meteors. *We daily behold and view divers* Meteors, *but very few are skill'd in their* Cauſes; *but thoſe that are not, may be informed. And I muſt tell you alſo, that this Book on peruſal hath been found ſo advantagious, that a perſon of quality hath lately taken pains to make divers worthy* Obſervations *upon it, which here I have ſubjoyned, becauſe you ſhould not pay for two Books inſtead of one. Theſe* Obſervations *were never publiſhed till now, and I truſt thou wilt find the Author did thee a Courteſie.* Farewell. The

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FINIS.

THE FIRST BOOK.

FOr as much as we intend in this Treatise, to declare the causes of all those bodies that are generated in the earth called *Fossilia*, as well as those other *Impressions* named of their height *Meteors* (which no writer hitherto hath done, that we have seen) the common definition given by the most Writers, in no wise will serve us; and whether we may borrow the name of *Meteoron*, to comprehend the whole subject of our work, we are not altogether out of doubt; although the Philosopher deriving it from doubtfulness, giveth us some colour so to take it; and peradventure we might be as well excused to apply it to *Minerals*, as other Authors are to use it for earthquakes: yet to avoid all occasions of cavilling at words, we shall both define and also describe the subject of our matter on this manner: It is a body compound without life natural: & yet to stop one

hole, because here wanteth the name of the thing to be defined; it is no new thing to them that have read *Aristotles* Works, to find a definition of that whereof there is no name. But what need you be so precise (will some man say?) mean you so to proceed in all your discourse? no verily, but because many of quick judgement, not considering the stile to be attempered to the capacity of the readers, will impute the plainness to the ignorance of the Author; we thought good in the beginning to pluck the opinion out of their minds, that (as the common saying is) they may know, we have skill of good manners though we little use them.

Aristot.

The Meteors are divided after three manner of wayes: First, into bodies perfectly and imperfectly mixed: Secondly, into moist impressions and dry: Thirdly, into fiery, airy, watry, and earthly. According to this last division, we shall speak of them in four Books following: but first we must be occupied a little in the generall description of the same, that afterward shall be particularly treated of. *Why*

Why they be called imperfectly mixed.

THey are called imperfectly mixed, becauſe they are very ſoon changed into another thing, and reſolved into their proper elements of which they do moſt conſiſt, as do all impreſſions, fiery, airy, watry; as ſnow into water, clouds into waters, &c.

Why they be called perfectly mixed.

THe laſt ſort, namely earthly Meteors, are called perfectly mixed, becauſe they will not eaſily be changed and reſolved from that form which they are in, as be ſtones, metalls, and other mineralls.

According to the quality of the matter, they are divided into moiſt and dry impreſſions, conſiſting either of Vapors or Exhalations. Vapors are called moiſt, and exhalations dry, which terms muſt be well noted, becauſe they muſt be much uſed.

Of the generall causes of all Meteors; and first of the materiall cause.

The materiall cause.

THe matter whereof the most part of Meteors doth consist, is either water or earth: for out of the water proceed vapors, and out of the earth come exhalations.

What be vapors, and what exhalations.

Vapor, as the Philosopher saith, is a certain watry thing, and yet is not water; so Exhalation hath a certain earthly nature in it, but yet it is not earth.

For the better understanding of Vapors, understand that they be as it were fumes or smokes warm and moist, which will easily be resolved into water, much like to the breath that proceedeth out of a mans mouth, or out of a pot of water standing on the fire. These vapors are drawn up from the waters and watery places by the heat of the Sun, even unto the middle region of the air, and there after divers manner of meeting with coldness, many kind of moist *Meteors* are generated, as sometimes clouds and rain, sometime snow and hail; and that such *Vapors* are so drawn up by the Sun, it is plain by experience: for

What the middle region is, shall be told afterward.

if

if there be a plash of water on a smooth and hard stone, standing in the heat of the Sun, it will soon be drie; which is none otherwise but that the Sun draweth up the water in thin Vapors: for no man is so fond to say, that it can sink into stone or metall; and it is as great folly to think it is consumed to nothing: for it is a generall rule, That that which is once a thing, cannot by changing become nothing: wherefore it followeth, that the water on the stone, as also on the earth, is for the most part drawn up, when the stone or earth is dryed. A generall Rule.

Exhalations are as smokes that be hot and dry, which because they be thin, and lighter than *Vapors*, pass the lowest and middle Region of the air, and are carried up even to the highest Region, where for the excessive heat, by nearness of the fire, they are kindled, and cause many kind of impressions. They are also sometimes *viscous*, that is to say, clamy, by reason whereof, they cleaving together & not being dispersed, are after divers sorts set on fire, & appear sometimes like Dragons, sometimes like What Exhalations be.

Goats, ſometimes like candles, ſometimes like ſpears.

By that which is ſpoken of *Vapours* and *Exhalations*, it is evident, that out of the fire and aire, no matter whereof *Meteors* ſhould conſiſt, can be drawn, becauſe of their ſubtilty and thinneſſe. For all *Exhalation* is by making a groſſer body more thinne: but the fire (we mean the elemental fire, and not the fire of the Kitchin chimney) is ſo ſubtil and thinne, that it cannot be made thinner; likewiſe the aire is ſo thinne, that if it be made thinner, it is changed into fire; and as the fire, if it were made thicker, would become aire; ſo the aire being made groſſer, would be turned into water. Wherefore to conclude this part, the great quantity of matter, that cauſeth theſe Meteors, is taken out of the earth and the water. As for the aire and the fire, they are mixed with this matter as with all other things, but not ſo abundantly, that they may be ſaid the material cauſe of any Meteor, though without them none can be generated.

The efficient cauſe.

The efficient cauſe of all Meteors, is that cauſ which maketh them; even as the Carpenter

penter is the efficient cauſe of an houſe. This cauſe is either firſt or ſecond.

The firſt and efficient cauſe is God the worker of all wonders, according to that teſtimony of the Pſalmiſt, which ſaith, Fire, hail, ſnow, ice, wind, and ſtorm, do his will and commandment; he ſendeth ſnow like wool, &c. Almighty God therefore being the firſt, principall and univerſall cauſe efficient of all natural works and effects, is alſo the firſt cauſe of theſe effects, whoſe profit is great, & operation marvelous.

The ſecond cauſe efficient, is double, either remote, that is to ſay, farre off, or next of all. The farther cauſe of them as of all other naturall effects, is the ſame; the Sun with the other Planets and Stars, and the very heaven it ſelf in which they are moved; but chiefly the Sun, by whoſe heat all or at leaſt wiſe the moſt part of the vapors and Exhalations are drawn up.

The next cauſe efficient as the firſt qualities, are heat and cold, which cauſe divers effects in Vapors & Exhalations.

But to return to the heat of the Sun, which is a very near cauſe, it is for

this purpose two wayes considered.

One way, as it is mean and temperate; Otherwise, as it is vehement and burning. The mean, is by which he draweth vapors out of the water, and exhalations out of the earth, and not only draweth them out, but also lifteth them up very high from the earth into the air, where they are turned into divers kinds of *Meteors*.

The burning heat of the Sun is, by which he burneth, dissipateth and consumeth the vapors and exhalations before he draweth them up, so that of them no *Meteors* can be generated.

These two heats proceed from the Sun, either in respect of the place, or the time; but most properly according to the casting of his beams either directly or indirectly.

In place where the Suns beames strike directly against the earth and the water, the heat is so great, that it burneth up the *Exhalations* and *Vapours*, so that there are no fiery *Meteors*, much less watery: as it is in the South parts of the world, under and near to the Equinoctiall line.

But in places where the beames are cast

caſt indirectly and obliquely, and that where they are not too nigh to the direct beams, nor too far off from them; there is a moderate heat, drawing out great abundance of matter, ſo that in thoſe Countries many *Meteors* of many ſorts are generated, as in the far Northparts are few butwatry impreſſions. Alſo in *Autumn* and *Spring* are oftner *Meteors* ſeen, than in Summer and Winter, except it be in ſuch places where the Summer and Winter are of the temper of the *Spring* and *Autumn*. Let this be ſufficient for the Efficient cauſes of impreſſions, as well firſt and principall, as ſecond and particular. Concerning the formall and finall cauſe, we have little to ſay, becauſe the one is ſo ſecret, that it is known of no man: the other ſo evident, that it is plain to all men. The eſſentiall Form of all ſubſtances, Gods wiſdome comprehendeth; the univerſall chief and laſt End of all things, is the glory of God. MiddleEnds (if they may be ſo called) of theſe impreſſions are manifold profits to Gods creatures, to make the earth fruitfull, to purge the air, to

ſet

ſet forth his power, to threaten his vengeance, to puniſh the world, to move to repentance; all which are referred to one end of Gods eternall glory, ever to be praiſed, Amen.

Of the places, in which they are generated.

THe places in which *Meteors* are cauſed, be either the air or the earth: in the air be generated rain, hail, ſnow, dew, blazing ſtars, thunder, lightning, &c. In the earth be wells, ſprings, earthquakes, metals, minerals, &c made, and as it were, in their mothers belly begotten and faſhioned. But for the better underſtanding hereof, ſuch as have not taſted the principles of *Philoſophy*, muſt conſider that there be four elements, Earth, Water, Air, and Fire, one compaſſing another round about, ſaving that the waters by Gods commandment are gathered into one place, that the land might appear. The higheſt is the ſphear of the Fire, which toucheth the hollowneſs of the Moons heaven: the next is the air, which is in the hollowneſs of the fire: the air within its hollowneſs

hollowneſs comprehendeth the water and the earth, whichbothmake but one ſpheare or Globe, or as the common ſort may underſtand it, one ball. So each element is within another, as ſcales of a perch are one above another: or (to uſe a groſs ſimilitude) as the peeles of an Onion are one within another: after the ſame ſort from the higheſt heaven to the earth that is loweſt, one part that is greater compaſſeth round about another that is leſſer. But for this preſent purpoſe it is to be known, that the aire isdivided into three regions, thehigheſt the middle and the loweſt. The higheſt becauſe it is next to the region of the fire, is exceeding hot: the loweſt being next the earth andwaters, is temperate, and by repercuſſion or ſtriking back of the Sunne beames waxeth hot, and by abſence of them ismade cold, being ſubject to winter and ſummer. The middle region of the aire is alwayes exceeding cold, partly becauſe the Sunne beames cannot be caſt back ſo high, and partly becauſe the cold that is there, between the heat above, and the heat beneath it, is ſo kept in, that it cannot get out, ſo that

What the regions of the aire be

that it must needs be excessively cold: for the water and the earth being both cold Elements, after the Sun setting in the night season do cool the air, even to the middle region. But in the morning the Sun rising warmeth the air, so far as his beames which are beaten back from the earth and the water, can extend and reach; whichis not so high as the middle region, and by heat on both sides is inclosed and kept, saving that a little thereof falleth down in the night, which the next day with much more is driven back again. Wherefore this region being so cold, is dark and cloudy, in so much that some doting Divines have imagined purgatory to be there in themiddle region of the air. In the highest region be generated Comets or blazingStars, and such like, of divers sorts. In themiddle region clouds, rain, storms, winds, &c. In the lowest region, dew, frost, hoar-frost, mists, bright rods, candles, burning about graves, andgallowses, where there is store ofclamy, fatty, or oilysubstance, also lights and flaming fires seen in fields, &c. And thus much for the general causes of all Meteors.

THE

THE SECOND BOOK
Of Fiery Meteors.

A Fiery impreſſion is an *Exhalation* ſet on fire in the higheſt or loweſt region of the air, or elſe appearing as though it were ſet on fire and burning.

They are therefore divided into flames & Apparitions. Flames are they which burn indeed, and are kindled with fire. Theſe are diſcerned by four wayes: by the faſhion of them, by their place, by the abundance of their matter, and by the want of their matter. Their placing is after the abundance and ſcarcity of the matter whereof they conſiſt; for if it be great, heavy, and groſs, it cannot be carried ſo far as the middle region of the air, and therefore is ſet on fire in the loweſt region: if it be not ſo great, light, and full of heat, it paſſeth the middle region, and aſcendeth to the higheſt, where it is eaſily kindled and ſet on fire. According

According to their divers faſhions, they have divers names: for they are called burning ſtubble, torches, dancing or leaping Goats, ſhooting or falling ſtarres, or candles, burning beames, round pillars, ſpears, ſhields, Globes or bowles, firebrands, lampes, flying Dragons or fire drakes, painted pillars, or broched ſteeples, or blazing ſtarres, called *Comets*. The time when theſe impreſſions do moſt appear, is the night-ſeaſon: for if they were cauſed in the day-time, they could not be ſeen, no more than the ſtars be ſeen, becauſe the light of the Sun which is much greater, dimmeth the brightneſs of them being leſſer.

Of the generation of the impreſſion called burning ſtubble or ſparkles of fire.

Sparks of fire.

THe generation of this *Meteor* is this; when the matter of the *Exhalation* is in all parts alike thin, but not compacted or knit together, then ſome part of it being carried up into the higheſt Region, by the fiery heat is ſet on fire before another part that cometh up after it, and ſo being kindled by little and

and little, flieth abroad like ſparkles out of a chimney, inſomuch that the common people ſuppoſe, that an infinite number of Stars fall down, whereas it is nothing elſe but the *Exhalation* that is thin, kindled in many parts, ſparkling as when ſaw-duſt or cole-duſt is caſt into the fire.

Of Torches.

Torches. TOrches or firebrands are thus generated: when the matter of the exhalation is long and not broad, being kindled at one end thereof in the higheſt region of the air, it burneth like a torch or firebrand, and ſo continueth till all the matter be burnt up, and then goeth out; none otherwiſe than a Torch when all the ſtuff is ſpent, muſt needs burn no longer.

Of dancing or leaping Goats.

Dancing Goats. DAncing Goats are cauſed when the exhalation is divided into two parts, as when two torches be ſeen together, and the flame appeareth to leap or dance from one part to the other, much like as balls of wilde fire dance up & down in the water. *Of*

Of ſhooting and falling Stars.

Shooting Stars.

A Flying, ſhooting, or falling Star, is when the exhalation being gathered as it were on a round heap, and yet not throughly compacted in the higheſt part of the loweſt region of the air, being kindled by the ſudden cold of the middle region, is beaten back, and ſo appeareth as though a Star ſhould fall, or ſlide from place to place. Sometime it is generated after another ſort; for there is an exhalation long & narrow, which being kindled at one end burneth ſwiftly, the fire running from end to end, as when a ſilk thred is ſet on fire at the one end. Some ſay it is not ſo much ſet on fire, as that it is direct under ſome Star in the firmament, and ſo receiving light of that Star, ſeemeth to our eyes to be a Star. Indeed ſometimes it may be ſo; but that it is not ſo alwayes, nor yet moſt commonly, it may be eaſily demonſtrated. The Epicureans, as they are very groſs in determining the chief goodneſs, ſo they are very fond in aſſigning the cauſe of this Meteor. For they ſay, that the Stars fall out

The Epicureans Opinion.

out of the firmament, & that by the fall of them, both thunder and lightning are cauſed: for the lightning (ſay they) is nothing elſe but the ſhining of that ſtar that falleth, which falling into a watery cloud, and being quenched in it, cauſeth that great thunder, even as hot Iron maketh a noiſe if it be caſt into cold water. But it is evident, that the Stars of the firmament cannot fall, for GOD hath ſet them faſt for ever; he hath given them a Commandment which they ſhall not paſs. And though they ſhould fall into the clouds, yet could they not reſt there, but with their weight being driven down, would cover the whole earth. Pſal. 148.

The greatneſs of Stars.

For the leaſt Star that is ſeen in the firmament, is greater than all the earth. Here will ſtep forth ſome merry fellow, which of his conſcience thinketh them not to be above 3. yards about, and ſay it is a loud lie; for he can ſee within the compaſs of a buſhel, more than 20. Stars. But if his buſhel were on fire 20. mile of, I demand how big it would ſeem unto him? He that hath any wit, will eaſily perceive that

A proof of the Stars greatneſs.

Stars being by all mens confeſſion, ſo many thouſand miles diſtant from the earth, muſt needs be very great, that ſo far off ſhould be ſeen in any quantity. Thus much for the ſhooting or falling Stars.

Of burning Candles.

Burning Candles.

WHen the *Exhalation* carried up into the higheſt part of the air, is in all parts thereof of equall and like thinneſs, and alſo long, but not broad, it is ſet on fire and blazeth like a Candle, until the *Exhalation* be quite conſumed.

Of burning Beams and round Pillars.

Burning Beames and round Pillars.

THeſe are cauſed, when the *Exhalation* being long and not very broad, is ſet on fire all at once, and ſo burneth like a great Beam or Log. The difference of Beams and Pillars is this; for Beams are when they ſeem to lie in length in the air, but they are called Pillars, when they ſtand right up, the one end nearer to the earth than the other.

Of Burning Spears.

Burning Spears.

BUrning Spears are generated, when a great quantity of exhalations, which

which may be called a dry cloud, is ſet on fire in the middeſt, and becauſe the cloud is not ſo compact that it ſhould ſuddenly rend, as when thunder is cauſed, the fire breaketh out at the edges of the cloud, kindling the thin *Exhalations*, which ſhoot out in great number like fiery ſpears, or darts, long and very ſmall; wherefore they continue not long: but when they fail, within a ſhort while after, more fire breaking out, they ſhoot as many more in their place: and likewiſe, when they are gone, others ſucceed, if the quantity of the matter will ſuffice, more than a dozen courſes. This impreſſion was ſeen in London, *An. Dom.* 1560. the 30. day of *January*, at 8. of the clock at night, the air in all other places being very dark; but in the North-eaſt where this cloud burned, it was as light as when the day breaketh toward the Sun riſing, in ſo much that plain ſhadow of things oppoſite was ſeen. The edge of this cloud was in the faſhion like the Rainbow, but in colour very bright, and oftentimes caſting forth almoſt innumerable darts

of wonderfull length, like ſquibs that are caſt into the air, ſaving that they move more ſwiftly than any ſquibs.

Of Shields, Globes, or Bowles.

Shields, Globes or Bowles.

THeſe *Meteors* alſo have their name of their faſhion, becauſe theyare broad, and appear to be round; otherwiſe their generation differeth not from the cauſe of the like impreſſions before mentioned.

Of Lamps.

Lamps.

THe Lamp conſiſteth of an *Exhalation* that is broad and thick, but not equally extended; namely, ſmaller at one end than at another, which being kindled about the middeſt thereof, burneth like a Lamp. The cauſe why, as well this impreſſion, as many other, appeareth round, is not for that alwaies they are round indeed, but becauſe the great diſtance cauſeth them to ſeem ſo. For even the ſquare forms far off ſeem to be round. It is written, that a Lamp fell down at *Rome*, when *Germanicus Cæſar* ſet forth the ſight of ſword-players.

Flying Dragons, fire Drakes.

Of flying Dragons or fire-Drakes.

Flying Dragons, or as Engliſhmen call

call them, fire-Drakes, be cauſed on this manner. When a certain quantity of *vapors* are gathered together on a heap, being very near compact, & as it were hard tempered together, this lump of *vapors* aſcending to the region of cold, is forcibly beaten back; which violence of moving is ſufficient to kindle it; although ſome men will have it to be cauſed between two clouds, a hot and a cold; then the higheſt part, which was climing upward, being by reaſon more ſubtile and thin, appeareth as the Dragons neck, ſmoking, for that it was lately in the repulſe bowed or made crooked, to repreſent the Dragons belly. The laſt part by the ſame repulſe turned upward, maketh the tayl, appearing ſmaller, for that it is both further off, and alſo for that the cold bindeth it. This Dragon thus being cauſed, flieth along in the air, and ſometime turneth to and fro, if it meet with a cold cloud to beat it back, to the great terrour of them that behold it: of whom ſome call it a fire-Drake: ſome ſay it is the Devil himſelf, and ſo make report to others. More than 47. years ago,

on May day, when many young folk went abroad early in the morning, I remember by six of the clock in the forenoon, there was news come to London, that the Devil, the same morning, was seen flying over the Thames: afterward came word that he lighted at Stratford, and there was taken and set in the Stocks, and that though he would fain have dissembled the matter, by turning himself into the likeness of a man, yet was he known well enough by his cloven foot. I knew some then living, that went to see him, and returning, affirmed, that he was seen flying in the air, but was not taken prisoner. I remember also, that some wished he had been shot at with Guns or shafts, as he flew over the Thames. Thus do ignorant men judge of these things that they know not. As for this Devil, I suppose it was a flying Dragon, whereof we speak, very fearfull to look upon, as though he had life, because he moveth, whereas it is nothing else but clouds and smoak: so mighty is God, that he can fear his enemies with these and such like operations,

rations, whereof ſome examples may be found in holy Scripture.

Of the Pyramidall Pillar-like aſpire or broached Steeple.

Of Spires.

THis ſharp-pointed pillar is generated in the higheſt region of the air, and after this ſort: When the *Exhalation* hath much earthly matter in it, the lighter parts and thinner (as their nature is) aſcending upward, the groſſer, heavier, and thicker, abide together in the bottom, and ſo is it of faſhion great beneath, and ſmall pointed above, and being ſet on fire it is ſo ſeen, and thereof hath his name.

Of fire ſcattered in the air.

Fire ſcattered.

FIre ſcattered in the air, or illuminations, are generated in the loweſt region of the air, when very dry and hot *Exhalations* are drawn up, and meeting with cold clouds, are ſent back again, which motions do ſet them a fire; whoſe parts being not equally thick or joyned together, ſeem as though fire were ſcattered in the air: Yea ſometimes, the whole air ſeemeth to burn, as though it would rain fire from Heaven, and ſo it hath

come to paſs, burning both Cities and Towns. Then judge how eaſie it was for God to rain fire upon *Sodom* and *Gomorrah*, for their ſins & wickedneſs.

Of lights that go before men, and follow them abroad in the fields, by the night ſeaſon.

Light that goeth before men, & followeth them in the night.

THere is alſo a kind of light that is ſeen in the night ſeaſon, & ſeemeth to go before men, or to follow them, leading them out of their way into waters, and other dangerous places. It is alſo very often ſeen in the night, of them that ſail on the Sea, and ſometime will cleave to the maſt of the Ship, or other high parts, ſometime ſlide round about the Ship, and either reſt in one part till it go out, or elſe be quenched in the water. This impreſſion ſeen on the land, is called in Latin *Ignis fatuus*, fooliſh fire, that hurteth not, but only feareth fools. That which is ſeen on the Sea, if it be but one, is named *Helena*; if it be two, it is called *Caſtor* and *Pollux*.

The fooliſh fire is an *Exhalation* kindled by means of violent moving, when by cold of the night, in the loweſt region of the air, it is beaten down; and

and then commonly, if it be light, seeketh to ascend upward, and is sent down again; so it danceth up and down. Else if it move not up and down, it is a great lump of glewish or oylymatter, that by moving of the heat in it self, is enflamed of it self, as moist Hay will be kindled of it self. In hot and fenny Countries, these lights are often seen, and where is abundance of such unctuous and fat matter, as about Church-yards, where through the corruption of the bodies there buried, the earth is full of such substance: wherefore in Church-yards, or places of common buriall, oftentimes are such lights seen, which ignorant and superstitious fools have thought to be souls tormented in the fire of Purgatory. Indeed the Devil hath used these lights (although they be naturally caused) as strong delusions to captive the minds of men with fear of the Popes Purgatory; whereby he did open injury to the blood of Christ, which only purgeth us from all our sins, & delivereth us from all torments both temporall and eternall, according to the saying of the Wise-man, The souls

ſouls of the righteous are in the hands of God, and no torment toucheth them. But to return to the lights, in which there are yet two things to be conſidered. Firſt, why they lead men out of their way. And ſecondly, why they ſeem to follow men and go before them. The cauſe why they lead men out of the way, is, that men, while they take heed to ſuch lights, and are alſo ſore afraid, they forget their way, & then being once but a little out of their way, they wander they wot not whither, to waters, pits, and other very dangerous places. Which, when at length they hap the way home, will tell a great tale, how they have been led about by a ſpirit in the likeneſs of Fire. Now the cauſe why they ſeem to go before men, or to follow them, ſome men have ſaid to be the moving of the air, by the going of the man, which air moved ſhould drive them forward if they were before, and draw them after if they were behind. But this is no reaſon at all, that the Fire which is oftentimes three or four miles diſtant from the man that walketh, ſhould

ſhould be moved to and fro by that air which is moved through his walking, but rather the moving of the air and the mans eyes, cauſeth the fire to ſeem as though it moved, as the Moon to children ſeemeth, if they are before it, to run after them: if ſhe be before them, to run before them, that they cannot overtake her, though ſhe ſeem to be very near them. Wherefore theſe lights rather ſeem to move, then that they be moved indeed.

Of Helena, Caſtor and Pollux.

Helena, Caſtor, Pollux.

WHen the like ſubſtance in the loweſt region of the air, over the Sea, by the like occaſion is ſet on fire, if there be one only, it is called *Helena*; if there be two, they are called *Caſtor*, and *Pollux*. Theſe impreſſions will oftentimes cleave to the maſt, and other parts of Ships, by reaſon of the clamineſs and fatneſs of matter. *Helena* was of the Heathen men taken as a Goddeſs, the daughter of *Jupiter* and *Leda*. *Caſtor* and *Pollux* were her brethren. *Helena* was the occaſion that *Troy* was deſtroyed; therefore the Mariners by experience trying, that one flame

flame of fire appearing along, signified a tempeſt at hand, ſuppoſed the ſame flame to be the goddeſs *Helena*, of whom they look'd for nothing but deſtruction. But when two lights are ſeen together, they are a token of fair weather, & good luck: the Mariners therefore believed that they were *Caſtor* and *Pollux*, which ſailing to ſeek their ſiſter *Helena*, being carried to *Troy* by *Paris*, were never ſeen after, & thought to be tranſlated into the number of the gods, that gave good ſucceſs to them that ſail, as we read in the laſt Chapter of the Acts of the Apoſtles, that the Ship wherein St. *Paul* ſailed, had a badge of *Caſtor* and *Pollux*. A naturall cauſe why they may thus foreſhew either tempeſt or calmneſs, is this; One flame alone may give warning of a tempeſt, becauſe that as the matter thereof is compact, and not diſſolved; ſo it is like, that the matter of the tempeſt (which never wanteth) as wind and clouds, is ſtill together, and not diſſipated, then is it like not long after to ariſe. By two flames together may be gathered, that as this *Exhalation* which is very thick, is divided: ſo

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the thick matter of tempeſts is diſſolved and ſcattered abroad by the ſame cauſe that this is divided. Therefore not without a reaſon, the Mariner to his mates may promiſe a proſperous courſe

Of flames that appear upon the hairs of men or beaſts.

Flames upon hairs of men and beaſts.

THere is another kind of fiery impreſſion, which is flames of fire upon the hairs of men and beaſts, eſpecially horſes. Theſe are ſometime clammy *Exhalations*, ſcattered abroad in the air in ſmall parts, which in the night, by reſiſtance of the cold, are kindled, cleaving on horſes ears, on mens heads and ſhoulders that ride or walk. In that they cleave upon hairs, it is by the ſame reaſon that the dew will be ſeen alſo upon hairs or garments, whoſe wool is high, as frize mantels and ſuch like. Another ſort of theſe flames are cauſed, when mens or beaſts bodies being chafed, ſend forth a fat & clammy ſweat, which is in like manner kindled, as the ſparks of fire that are ſeen when a black horſe is curried. *Livius* reporteth of *Servius Tullius*, that as he lay aſleep, being a child,

Livius. Servius Tullius.

child, his hair ſeemed to be all on a flame, which for all that did not burn his hair or hurt him. The like hiſtory he reciteth of one *Marius* a Knight of *Rome*, that as he made an Oration to his Souldiers in *Spain*, they ſaw his head burning on a light fire, and himſelf not ware of it. Thus much concerning theſe Flames.

Marius.

Of Comets or Blazing Stars.

Comets or blazing Stars.

A *Comet* is an exhalation hot and dry, of great quantity, fat and clammy, hard-compact like a great lump of pitch, which by the heat of the Sun is drawn out of the Earth into the higheſt region of the Air, and there by the exceſſive heat of the place is ſet on fire, appearing like a Star with a blazing tayl; and ſometime is moved after the motion of the Air which is circular, but it never goeth down out of the compas of ſight, though it be not ſeen in the day-time for the brightneſs of the Sun, but ſtill burneth until all the matter be conſumed. An argument of the greatneſs is this, that there was never any *Comet*

met yet perceived, but at the leaſt it endured 7. dayes; but much longer they have been ſeen; namely forty dayes long, yea fourſcore dayes; and ſome ſix moneths together. Wherefore it muſt needs be a wonderfull deal of matter that can give ſo much nouriſhment for ſo great and fervent fire, and for ſo long a time.

There are conſidered in a *Comet* ſpecially the Colour and Faſhion, which both ariſe of the diſpoſition of the matter.

Their Colours be either white, ruddy, or blew. If the matter be thin, the colour is white; if it be meanly thick, then is the Comet ruddy, after the colour of our fire; but when the matter is very thick, it is blew, like the burning of brimſtone. And as the matter is more or leſs after this diſpoſition, ſo is the Comet of colour more or leſs like to theſe three principall colours: ſome yellowiſh, ſome duskiſh, ſome greeniſh, ſome watchet, &c.

In Faſhion are noted three differences; for either they ſeem to be round, with beams round about, or with a beard

beard hanging downward, or elſe with a tayl ſtretched out ſidelong in length. The firſt faſhion is when the matter is thickeſt in the midſt, and thin round about the edges; the ſecond is when the Exhalation is upward thick, and in length downward alſo meanly thick; the third form is like the ſecond, ſaving that the tayl hangeth not down but lyeth aſide, and is commonly longer than the beard.

The temper of the four Quarters.

The time of their generation is oftneſt in Autumn or Harveſt: for in the Spring there is too much moiſture, and too little heat to gather a Comet; in Summer is too much heat, which will diſperſe and conſume the matter that it cannot be joyned together; as for Winter, it is clean contrary to the nature of a Comet, which is hot and dry, Winter being cold and moiſt: therefore no time ſo meet as Autumn.

The ſignification of Comets.

Now for ſo much as many learned men have gone about to declare the ſignification of Blazing Stars, we will omit nothing that hath any ſhadow of Reaſon, but declare what is written of them.

Such

Such things as are set forth of the betokening of Comets are of two sorts: The first is of natural, The second of Civil or Politick Effects.

They are said to betoken Drought, Barrenness of the Earth, and Pestilence.

Drought, because a Comet cannot be generated without great heat; and much moisture is consumed in the burning of it.

Barrenness, because the fatness of the Earth is drawn up, whereof the Comet consisteth.

Pestilence, for so much as this kind of Exhalation corrupteth the Air, which infecteth the bodies of men and beasts.

The second sort might well be omitted, saving that *Aristotle* himself disdaineth not to seek out Causes for some of them. Aristot.

Generally it is noted of all Historiographers, that after the appearing of Comets, most commonly follow great and notable Calamities. Beside this, they betoken (say some) Wars, Seditions, Changes of Commonwealths, and the Death of Princes and Noble men.

For what time Comets do ſhine, there be many hot and dry Exhalations in the Air, which in dry men kindle heat, whereby they are provoked to anger: of anger cometh brawling: of brawling, fighting and war: of war, victory: of victory, change of commonweaſths: then alſo Princes living more delicately than other men, are more ſubject to infection, and therefore die ſooner than other men. If it were lawfull to reaſon in this ſort, we might induce them to betoken not only theſe few things, but all other things that chance in the world.

Yet theſe predictions have a ſhew of Reaſon, though it be nothing neceſſary; but it is a wonder to ſee how the Aſtrologians dote in ſuch devices, they are not aſhamed to an earthly ſubſtance to aſcribe an heavenly influence, and in order of judgment to uſe them as very Stars. Surely, by as good reaſon as to the celeſtiall Stars they attribute divine influences and effects. But this their folly hath been ſufficiently detected by divers godly and learned men, and this place requireth

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no long discourse thereof. Wherefore this shall suffice, both for the natural Causes of Blazing Stars, and also for all Flames in general. It followeth therefore, that with like brevity we declare the Causes of Fiery Apparitions.

Of Apparitions.

Apparitions. AN Apparition is an Exhalation in the lowest or highest Region of the Air, not verily burning, but by refraction of light either of the Sun or of the Moon, seemeth as though it burned: which appearance of colour riseth not of the mixtion of the four qualities, as it doth in bodies perfectly mixed, as Herbs, Stones, &c. but only the falling of light upon shadow: the light is in stead of white, and the shadow of darkness in stead of black. These diversly mixed according to the divers dispositions of the Exhalation, which ministreth variety by thickness or thinness, cause divers Colours.

There be commonly recited three kinds of Fiery Apparitions; *Colours*,

Wide-gapings, and *Deep holes*, which appear in the Clouds.

Of Colours.

Colours in the Air.

Colours are here meant, when there is nothing else to be noted but the Colours of the Clouds: and they are caused (as it is said) by casting the light into the shadowy Cloud, according as it exceedeth more or less in thickness, whereof some be very bright-white, and that is when the Exhalation is very thin; some yellowish, when the Exhalation is thicker; some ruddy, when it is meanly thick; and very black, when it is very thick. The red and ruddy Colours are seen in the morning and evening, when the light of the Sun is not in his full force: for at other times of the day his light is too vehement, clear, strong, and piercing. Thus much of Colours.

Of Wide-gaping.

Wide gaping of clouds in the Air.

Wide-gaping is caused when an Exhalation is thick in the midst, and thin on the edges, then the light being received into it causeth it to appear as though the sky did rend, and fire break out of it.

Of

Of round opening Hiatus.

Theſe holes, called *Hiatus*, differ from Wide-gapings in nothing but that they be leſs, and therefore ſeem as though they were deep pits or holes, and not rending or gaping; And theſe be thoſe Apparitions that appear Fiery, and yet be not ſo indeed. Therefore let this be ſufficient to have ſhewed the natural Cauſes of all Fiery Meteors. Round opening in the Air.

THE THIRD BOOK.

Of Airy Impreſſions.

UNder the name of Airy Impreſſions, bee comprehended ſuch Meteors, whoſe matter is moſt of the Air. Of this ſort be Winds, Earthquakes, Thunder, Lightnings, Storm-Winds, Whirlwinds, Circles, Rain-bowes, The White Circle, called of ſome WATLING *ſtreet*, many

many Sunnes, many Moons.

Of Winds.

Winds. THe Wind is an Exhalation hot and dry, drawn up into the Air by the power of the Sun, and by reason of the weight thereof being driven down, is laterally or sidelong carried about the Earth. And this Definition is not to be understood of generall Winds that blow over all the Earth, or else some great Regions; but besides these there be particular Winds which are known but only in some Countries, and them not very large. These Winds oftentimes have another manner of generation, and that is on this manner;

The second kind of Winds. It must needs be confessed, that within the globe of the Earth be wonderfull great holes, caves or dungeons, in which when Air aboundeth (as it may by divers Causes) this Air that cannot abide to be penned in, findeth a little hole in or about those Countries, as it were a mouth to break out of, and by this means bloweth vehemently

mently: yet that force and vehemency extendeth not far; but as the wind that cometh forth of bellows, near the coming forth is ſtrong, but far off is not perceived: ſo this particular Wind, in that particular Countrey where it breaketh forth, is very violent and ſtrong, in ſo much that it overthroweth both trees and houſes, yet in other Countries not very far diſtant, no part of that boiſterous blaſt is felt. Wherefore this Wind differeth from the generall Winds both in Qualities and Subſtance or Matter: for the Matter of them is an Exhalation, and the Qualities ſuch as the nature of the Exhalation is, very Airy, but not Air indeed; but of this particular Wind the Matter and Subſtance is moſt commonly Air.

The third kind of Wind.

There is yet a third kind of Wind, which is but a ſoft, gentle, and cool moving of the Air, and cometh from no certain place (as the generall Wind doth) yea it is felt in the ſhadow under trees, when in the hot light and ſhining of the Sun it is not perceived. It cometh whisking ſuddenly,

ly, very pleasant in the heat of Summer, and ceaseth by and by; this properly is no Wind, but a moving of the Air by some occasion.

As for the general Winds, they blow out of divers Quarters of the Air, now East, now West, now South, now North, or else inclining to one of the same Quarters: Among which the East-wind following the nature of the Fire, is hot and dry; the South-wind expressing the quality of the Air, is hot and moist; the Western blast agreeing with the Waters property, is cold and moist; the North that never was warmed with the heat of the Sun, being cold and dry, partaketh the condition of the Earth. The middle Winds have middle and mixed qualities, after the nature of those four principall Winds, more or less, as they incline toward them, more or less.

The qualities of the winds and the four quarters of the world.

The quality of middle winds.

Generally the profit of all Winds, by the wonderfull wisdom of the Eternal God, is very great unto his Creatures. For besides that these Winds alter the Weather, some of them bringing rain, some drines, some frost and snow, which

The profit of winds.

which all are neceſſary: there is yet an univerſall commodity that riſeth by the only moving of the Air, which were it not continually ſtirred as it is, would ſoon putrifie, and being putrified would be a deadly infection to all that hath breath upon the Earth. Wherefore this Wind, whoſe ſound we hear, and know not from whence it cometh nor whither it goeth (for who can affirm from whence it was raiſed, or where it is laid down?) as all other Creatures beſide, does teach us the wonderfull and wiſe providence of God, that we may worthily cry out with the Pſalmiſt, and ſay, *O Lord, how manifold are thy works! in wiſdome haſt thou made them all*, &c. Let this be ſufficient to have ſhewed the generation of the Winds. John 3. Pſal. 104.

Of Earthquakes.

Earthquakes.

AN Earthquake is a ſhaking of the Earth, which is cauſed by means of wind and *Exhalations*, that be enclo-ſed within the caves of the Earth, and can find no paſſage to break forth, or elſe

elſe ſo narrow a way, that it cannot ſoon enough be delivered.

Wherefore, with great force and violence it breaketh out, and one while ſhaketh the Earth, another while rendeth and cleaveth the ſame; ſometime it caſteth up the Earth a great height into the Air, and ſometime it cauſeth the ſame to ſink a great depth down, ſwallowing both Cities and Towns, yea and alſo mighty great Mountains, leaving in the place where they ſtood nothing but great holes of an unknown depth, or elſe great lakes of Waters.

Of divers kinds of Earthquakes.

Divers kinds of Earthquakes.

DIvers Authors write diverſly of the kinds of Earthquakes, ſome making more and ſome leſs, but we ſhall be content at this time to comprehend them in four ſorts.

The firſt kind is when the Earth is ſhaken laterally, to one ſide, which is when the whole force of the wind driveth to one place, and there is no other contrary motion to let it. This wind, if it be not great, ſhaketh the Earth,

Earth, that it trembleth as a man that hath a fit of an ague, and doth no more harm: but if it be great and violent, it looseth the foundations of all buildings, be they never so strong, and overthroweth whole Cities, but especially the great buildings, and not only such buildings, but sometimes also casteth down great Hills, that cover and overwhelm all the valleys under them. Many noble and great Cities have been overthrown by this kind of Earthquake. It is written, that twelve of the most beautifull Cities, and most sumptuous buildings in all *Asia*, were overthrown & utterly destroyed with an Earthquake. How often *Antiochia*, yea within short time was destroyed, they which have read the Histories, can testifie.

Twelve Cities overthrown with one Earthquake.

How terrible was the Earthquake that shook *Constantinople* a whole year together, that the Emperour and all the people were fain to dwell abroad in the fields under tents and pavilions, for fear their houses would fall on their heads, it is recorded in the Chronicles, and worthy to be remembred.

Constantinople the chiefest City of Greece, now the Turks Palace.

The second kind.

The second kind is, when the Earth with

with great violence is lifted up, ſo that the buildings are like to fall, and by and by ſinketh down again: this is, when all the force of the winds ſtriveth to get upward, after the nature of gunpowder, and finding ſome way to be delivered out of bondage, the Earth that was hoiſted up, returneth to his old place.

The third kind.

The third kind is a gaping, rending, or cleaving of the Earth, when the Earth ſinketh down, and ſwalloweth up Cities, and Towns, with Caſtles, and Towers, Hills, and Rocks, Rivers, and Floods, ſo that they be never ſeen again.

Earthquake on the Sea.

Yea the Sea in ſome places hath been drunk up, ſo that men might have gone over on foot, untill the time of tide or flood returning covered the place with Waters again. But in the land, where this Earthquake ſwalloweth up any City, or Country, there appeareth nothing in the place thereof, but a marvellous wide and deep gulf, or hole. *Ariſtotle* maketh mention of divers places, and regions, that were overthrown with this kind of Earthquake.

Ariſtot.

The

The fourth kind is, when great mountains are cast up out of the Earth, or else when some part of the land sinketh down, and in stead thereof arise Rivers, Lakes, or Fires, breaking out with smoak and ashes. It causeth also overflowings of the Sea, when the Sea bottome is lifted up, and by this means arise many Islands in the Sea, that never were seen before. These and other such miracles are often found in the Writers of Histories, also in the *Philosophers*, as *Aristotle*, *Seneca*, and *Plinius*.

The fourth kind.

New Islands in the Sea.

Aristot.
Seneca.
Plinius.

Nevertheless, the effects of some as most notable, it shall not be unprofitable to recite. *Plato* in his *Dialogue* entituled *Timeus*, maketh mention by the way of a wonderfull Earthquake, whereby not only *Africa* was rent asunder from *Europe* and *Asia* (as it is indeed at this day, except a little neck by the red Sea) the Sea entring between them that now is called *Mare Mediterraneum*: but also a wonderfull great Island, which he affirmeth was greater than *Africa* and *Asia* both, called *Atlantis*, was swallowed up, and covered by the Waters, in so much, that

Plato.

A wonderfull Earthquake.

Africa, Europe, Asia, the three parts of the earth Mare mediterraneum, because it goeth thorow the midst of the earth.

Atlantis an Island.

on

on the Sea called *Atlanticum*, for a great while after no Ship could sail, by reason that the same huge Sea, by resolution of the Earth of that mighty Island, was all turned into mud.

The famous Ile of *Sicilia* was also sometime a part of *Italy*, and by Earthquake rent asunder from it. *Seneca* maketh mention of two Islands, *Theron* and *Therea*, that in his time first appeared. It should seem both by *Aristotle*, and also by *Herodotus*, that *Egypt* in ancient time was a gulph of the Sea, and by Earthquake made a dry land. During the reign of *Tiberius* the Emperor, twelve notable Cities of *Asia* were overthrown in one night, &c.

Seneca. Theron & Therea. Arist. Herodotus. Egypt sometime a gulph of the Sea.

How so great Winds come to be under the Earth.

THe great Caves and Dens of the Earth must needs be full of Air continually; but when by the heat of the Sun the moisture of the Earth is resolved, many *Exhalations* are generated as well within the Earth as without; and whereas the places were full be-

before, so that they could receive no more, except part of that which was in them were let out in such Countries where the Earth hath few pores, or else where they are stopped with moisture, it must needs follow, that these *Exhalations*, striving to get out, must needs rend the Earth in some place, or lift it up, so that either they may have free passage, or else room enough to abide in.

Of signs and tokens that go before an Earthquake most commonly.

The signs of an earthquake

THe first, is the raging of the Sea, when there are no tempestuous Winds to stir it, yea, when the Air is most calm without Wind.

The cause why the Sea then rageth, is, that the Wind beginneth to labour for passage that way, and finding none, is sent back, and soon after shaketh the land.

The second sign is calmness of the Air, and cold, which cometh to pass, by reason that the *Exhalation* that should be abroad is within the Earth.

The third sign, is said to be a long thin

thin ſtrake of Cloud ſeen, when the ſky is clear, after the ſetting of the Sun. This (ſay they) is cauſed, by reaſon that the *Exhalation* or Vapor, which is the matter of Clouds, is gone into the Earth.

Others affirm, that it is the *Exhalation* that breaketh out of ſome narrow hole of the Earth, out of which the reſt of the Wind cannot iſſue, neither will it wait the time: wherefore within a while after, it ſeeketh and maketh it ſelf, by ſudden eruption, a broader way to be delivered out of priſon.

Alſo the Sun, certain dayes before it appeareth dim, becauſe the Winds, that ſhould have purged and diſſolved the groſs Air, that cauſeth this dimneſs to our eyes, is encloſed within the bowels of the Earth.

The Water in the bottome of deep wells is troubled, and the ſavour thereof infected, becauſe the peſtilent *Exhalations* that have been long encloſed within the Earth, do then begin a little to be ſent abroad. For thereof cometh it, that in many places where Earthquakes have been, great abundance

dance of ſmoak, flame, and aſhes, is caſt out, when the abundance of brimſtone that is under the ground, through violent motion is ſet on fire, and breaketh forth. Finally, who knoweth not, what ſtinking Minerals, and other poyſonous ſtuff do grow under the Earth? wherefore it is no wonder, if Well-water, before an Earthquake, be infected: but rather it is to be marvelled, if after an Earthquake there follow not a grievous Peſtilence, when the whole maſs of infection is blown abroad.

Laſt of all, there is heard before it, in the time of it, and after it, a great noiſe and ſound under the Earth, a terrible groaning, and a very Thundring, yea, ſometimes when there followeth no Earthquake at all, when as the wind, without ſhaking of the Earth, findeth a way to paſs out at. And theſe for the moſt part, or at leaſt ſome of them, are forewarnings, that the moſt fearfull Earthquake will follow, than the which there is no naturall thing that bringeth men into a greater fear. *Cato* was very curious to

Thundering under the earth.

Cato.

confeſs himſelf, that he repented that ever he went by water, when as he might have gone by land. But what land can be ſure, if it be the Lords will by this work of his to ſhake it? what building ſo ſtrong, that can defend us, when the more ſtrong, the more danger, the higher, the greater fall?

Of Thunder.

Thunder. THunder is a ſound cauſed in the Clouds, by the breaking out of a hot and dry Exhalation, beating againſt the edges of the Cloud. It is often heard in Spring and Summer, by reaſon that the heat of the Sun then draweth up many Exhalations, which meeting in the middle region of the Air with moiſt and cold Vapors, are together with them enclofed in a hollow Cloud: but when the hot Exhalation cannot agree with the coldneſs of the place, by this ſtrife being driven together, made ſtronger, and kindled, it will ſtraight break out, which ſudden and violent eruption cauſeth the noiſe which we call Thunder. A Similitude

militude is put by great Authors, of moist wood that cracketh in the fire: we may adde hereunto the breaking of an egge in the fire, of an apple, or any like thing; for whatsoever holdeth and withholdeth inclosed any hot wind, so that it can have no vent, it will seek it self a way by breaking the skin, shell, or case. It were no ill comparison to liken Thunder to the sound of a Gun, which be both caused of the same, or very like causes. A similitude.

The sound of Thunder is divers; after which men have divided the Thunder into divers kinds, making first two sorts, that is, small Thunder and great. But as for the diversity of sounds, generally it comes of the divers disposition of the clouds, one while having more holes than at another, sometime thicker in one place than in another. Divers kinds of Thunders.

The small or little Thunder is, when the Exhalation is driven from side to side of that Cloud, making a noise, and either for the small quantity and less forcibleness, or else for the thickness of the Clouds walls, is not able to break them, but rumbleth up and down Small Thunder, and the kinds thereof.

down within the cloud, whose sides be stronger than the force of the Exhalation is able to break, it runneth up and down within, and striking against the cloud and moist sides, maketh a noise not unlike the quenching of hot iron in cold water.

And if the Exhalation be meanly strong, and the cloud not in all places of like thickness, it breaketh out at those thin places with such a buzzing, as wind maketh blowing out of narrow holes.

But if the cloud be so thin that it cannot keep in the Exhalation, although it be not kindled, then it bloweth out with like puffing, as wind cometh out of a pair of bellows.

Great thunder, and the kinds thereof.

A great Thunder is when the Exhalation is much in quantity, and very hot and dry in quality, the clouds also very thick and strong, that easily will not give place to the wind to escape out.

Wherefore if the Exhalation do vehemently shake the cloud, though it do not at the first disperse it, it maketh a long and fearfull rumbling against

gainſt the ſides of the cloud, untill at the laſt being made ſtronger by ſwifter motion, it diſſolveth the cloud, and hath liberty to paſs out into the open Air; the cloud diſſolved droppeth down, and then followeth a ſhowr of Rain.

Otherwhiles it ſhaketh the cloud not long, but ſtraightway rendeth it a long ſpace and time, whoſe ſound is like the rending of a Broad-cloth, which noiſe continueth a pretty while.

And ſometime it diſcuſſeth the cloud at once, making a vehement and terrible crack like a Gun, ſometime with great force caſting out ſtones, but moſt commonly fire, which ſetteth many high places on fire. As in the year of our Lord 1561. the fourth day of June, the ſteeple of St. *Pauls* Church in *London* was ſet on fire, as it hath been once or twice before, and burned.

How far thunder is heard.

The noiſe of Thunder though it be great in ſuch places over which it is made, yet is not heard far off, eſpecially againſt the wind; whereof we had experience alſo in the year of our

Lord, 1561. on Saint *Matthias* day in February, at the evening, when there was a great flash of Lightning, and a very terrible crack of Thunder following; they that were but 15. Miles from *London* Westward heard no noise nor sound thereof; the Wind that time was Western.

The profit of thunder.

The effect of Thunder is profitable to men, both for that the sweet showr doth follow it, and also for that it purgeth and purifieth the Air, by the swift moving of the Exhalation that breaketh forth, as also by the sound, which dividing and piercing the Air, causeth it to be much thinner: which may be verified by an History that *Plutarch* in the life of *Quincius Flaminius* reporteth, that there was such a noise made by the Grecians, after their Liberty was restored, that the Birds of the Air that flew over them were seen fall down, by reason that the Air divided by their cry, was made so thin, that there was no firmity or strength in it to bear them up. And let this suffice for Thunder, which Lightning succeedeth in treaty, that seldom is from it in nature.

Plutarchus: T. Quincius Flaminius.

Of

Of Lightning.

AMong the divers kinds of Lightnings which Writers in this knowledge do number, we ſhall treat only of four kinds; yet ſo, that under theſe four all the reſt may be comprehended. The names we muſt borrow of the Latin Tongue; the firſt is *Fulgetrum*, the ſecond *Coruſcatio*, the third *Fulgur*, the fourth *Fulmen*. Lightning. Fulgetrum Coruſcatio, Fulgur Fulmen.

Of *Fulgetrum*.

Fulgetrum we call that kinde of Lightning which is ſeen on Summer nights and evenings, after a hot day. The generation hereof is ſuch; when many thin, light, and hot Exhalations, by the immoderate heat have been drawn up from the Earth, and by the abſence of the Sun, be deſtitute of the force whereby they ſhould have been drawn further upward, yet ſomething aſcending by their own nature, in that they be light and hot, they meet with the cold either of the night in the Fulgetrum.

loweſt region, or elſe of the Air in the middle region; and ſo by reſiſtance of contraries (as it hath been oft before rehearſed) they are beaten back, and with vehement moving ſet on fire. This Lightning commonly goeth out in the Air terrible to behold, not hurtfull to any thing, except ſometime when the matter is earthy and groſs, being ſtricken down to the earth, it blaſteth corn and graſs, with other ſmall hurt. Sometime it ſetteth a barn or thatched houſe on fire.

The colour of this Lightning.

The Colour of this Lightning as of all other, is divers, partly according to the matter, and partly according to the light. If the matter be thin, it is white; if the ſubſtance be groſs, it is ruddy, like flames of fire. In great light, as in the day, it appeareth white; in the night, ruddy: yet ſometime in the day time we may ſee it yellow, which is a token that the matter is wonderfull thick and groſs. Old Wives are wont to ſay, that no night in the year except one paſſeth without Lightning, but that is as true as the reſt of their Tales, whereof they have great ſtore.

Of

Of Coruſcation.

COruſcation is a gliſtering of fire, rather than fire indeed; and a glimering of Lightning, rather than Lightning it ſelf: which is two manner of wayes: One way, when clouds that be lower than the upper part of the Earth, without the compaſs of our ſight are enflamed, and the reflection of that flame is caſt up into our ſight, appearing in all points like Lightning, ſaving that the Air where it appeareth, is ſo clear, that we are perſwaded no Lightning can be there cauſed. Another way is, when there be thick clouds over us, and commonly a double order of clouds, one above another: if Lightning or any other Inflammation be in the upper part of theſe clouds, the light of them pierceth thorow the lower parts, as thorow a glaſs, and ſo appeareth as though it Lightned, when perhaps it did Lighten indeed, yet that which we ſaw was but the ſhadow thereof: and this is often without Thunder. Coruſcation.

Of

Of Fulgur.

Fulgur.

Fulgur is that kinde of Lightning which followeth Thunder, whereof we have ſpoken before. For when that violent Exhalation breaks forth, making a noiſe as it beateth againſt the ſides of the Cloud, with the ſame violence it is ſet on fire, and caſteth a great light, which is ſeen far and near. And although the Lightning appear unto us a good pretty while before the Thunder-clap be heard, yet it is not cauſed before the noiſe, if any Thunder at all follow, but either is after it, or with it. Wherefore that we ſee it before we hear the Thunder, may be aſcribed either to the quickneſs of our ſight that preventeth the Hearing, or elſe to the ſwift moving of the fire, and the light thereof to our eyes, and the ſlow motion of the ſound unto our ears and hearing.

The lightning is not before the thunder, though it ſeem ſo.

Sight preventeth hearing.

Theſe three kinds of Lightnings are more fearfull than hurtfull, but the fourth ſeldome paſſeth without ſome dammage doing.

Of

Of the fourth kind, called Fulmen.

THe moſt dangerous, violent, and hurtfull kind of lightning is called *Fulmen*, whoſe generation is ſuch as followeth: What time a hot *Exhalation* is encloſed in a Cloud, and breaking the ſame, burſteth forth, it is ſet on fire, and with wonderfull great force ſtricken down toward the Earth.

The crack of Thunder that is made when this Lightning breaketh out, is ſudden, ſhort, and great, like the ſound of a Gun. And oftentimes a great ſtone is blown out with it, which they call the Thunder-bolt, which is made on this manner.

In the *Exhalation* which is gathered out of the Earth, is much earthly matter, which clottering together by moiſture, being clammy by nature, conſiſting of brimſtone, and other metalick ſubſtance, by the exceſſive heat is hardened as a brick is in the fire, and with the mighty force of the *Exhalation*, ſtrongly caſt toward the Earth, and ſtri-

The thunder-bolt caſt out of the clouds.

striketh down steeples, and high buildings of stone, and of wood, passeth thorow them, and setteth them on fire; it cleaveth trees, and setteth them on fire: and the stronger the thing is that resisteth it, the more harm it doth to it. It is sharp-pointed at one end, and thick at the other end, which is caused, by reason that the moister part, as heavier, goeth to the bottome of it; so is the top small, and the bottome thick.

Strongest things are most hurt of Lightning.

How deep a thunder-bolt goeth into the earth.

Men write, that the thunder-bolt goeth never above five foot deep, when it falleth upon the Earth: which standeth with reason, both because the strength of it is weakened before it come so near the ground, and also because the continuall thicknes of the Earth breaketh the force, were it never so great.

Aristot. Seneca. Plinius.

Both *Aristotle*, *Seneca*, and *Plinius*, divide this lightning into three kinds.

Of the first.

Day lightning.

THe first is dry, which burneth not to be felt, but divideth & appeareth with wonderfull swiftnes: For being subtile and pure, it passeth thorow the

the pores of any thing, be they never ſo ſmall; and ſuch things as give place unto it, it hurteth not; but ſuch things as reſiſt, it divideth and pierceth. For it will melt money in mens purſes, the purſes being whole and unharmed. Yea, it will melt a ſword in the ſcabberd, and not hurt the ſcabberd at all. A wine veſſel it will cleave, and yet the wine ſhall be ſo dull, that by the ſpace of three dayes it will not run out. It will hurt a mans hand, and not his glove. It will burn a mans bones within him to aſhes, and yet his skin and fleſh ſhall appear fair, as though nothing had come to him. Yet otherwiſe the whole man in the moment of an hour ſhall be burned to aſhes, whereas his clothes ſhall not ſeem to have been touched. It will alſo kill the child in the mothers belly, and not hurt the mother: And all becauſe the matter is very ſubtile, and thin, burning, and paſſing thorow whatſoever it be, that will not give it free paſſage.

Money melted in mens Purſes, and ſwords in Scabberds.

Of

Of the ſecond kind.

Moiſt Lightning.

THe ſecond kind is moiſt: and becauſe it is verythin, it burneth not to aſhes, but only it blaſteth or ſcorcheth trees, corn and graſs: and by reaſon of the moiſtneſs it maketh all things black that it cometh near, as moiſt wood burning is ſmoaky, and maketh things near it to be black and ſmoaky.

Why it maketh black.

Of the third kind.

Groſs Lightning.

THe third kind is moſt like our common fire that we have here on the earth, of groſs and earthly ſubſtance: wherefore it leaveth a print where it hath been, or elſe conſumeth it into aſhes, if it be ſuch a body as will be burned with fire.

Of the Marvels of Lightning, and their cauſes.

The marvell of Lightning.

BEſide the wonderful effects of lightning, that have been already remembred,

membred, there be many other which hereafter enſue, with the reaſon and cauſes unto them belonging, as thus:

The nature of Lightning is, to poyſon beaſts that are ſtricken therewith, as though they had been bit by a Serpent. Lightning poyſoneth.

The cauſe of this is, that the matter of Lightning is much infected with Brimſtone, and other poyſonous metallike ſubſtance, becauſe it is thin, and giveth them paſſage into every part of the body

It is notable that *Seneca* writeth, how wine-veſſels of wood being burned with lightning, the wine would ſtand ſtill, and not run out: the reaſon hereof, is, the ſwift alteration and change, whereby alſo all the clammineſs of the wine is drawn to the outwardmoſt part, and ſo keepeth in the wine as in a skin, that by the ſpace of three dayes it will not run. It will alſo poyſon wine, inſomuch that they which drink thereof ſhall either be mad or die of it: the cauſe hereof was ſet forth before. Seneca. Wine not running, the Veſſels being broken.

Lightning that ſtriketh a poyſonous beaſt, purgeth it from the poyſon, in ſo much that it cauſeth a Serpent or Snake Lightning purgeth a poyſonous beaſt.

A Snake breedeth no Worms

Snake which it killeth to breed worms, which otherwiſe it would not do: but being purged from the naturall poyſon, by the ſwift piercing of the Lightning, nothing letteth but that it may breed worms, as all other corrupt fleſh will do.

Lightning openeth his eyes that ſleepeth, and cloſeth his that waketh.

If Lightning ſtrike one that ſleepeth, it openeth his eyes; and of one that waketh it ſhutteth the eyes. The cauſe is this, that it waketh him that ſleepeth, and killeth him, before he can cloſe his eyes again. And him that waketh, it ſo amazeth, that he winketh, as he will do at any ſudden chance: ſo he dieth, before he can open his eyes again.

Living things turn their face toward lightning.

All living things turn their face toward the ſtroke of the lightning, becauſe it is their nature to turn their head, if any thing come ſuddenly behind them. The reſt that have their face toward it when it cometh, never turn before they be killed.

The Reaſon why it killeth the child in the mothers womb, not hurting the mother, is the tenderneſs of the one, and the ſtrength of the other, when the Light-

Lightning is not vehement; otherwise both should die together.

Sometime Lightning burneth only the garments, shooes, or hair of men, not hurting their bodies, and then the Exhalation is nothing vehement.

Garments burnt, the body unhurt.

Sometime it killeth a man, and there appeareth no wound without, neither any hurt within, no not so much as any sign of burning: for then the Exhalation, which being kindled is called Lightning, is wonderfull subtile and thin, so swiftly passing thorow, that it leaveth no mark or token behind it.

Lightning causeth blindness, swelling, or Leprosie.

They that behold the Lightning, are either made blind, or their face swelleth, or they become Lepers; for that Fiery Exhalation received into the pores of their face and eyes, maketh their face to swell and break out into a Leprosie, and also drieth up the Chrystalline humour of their Eyes, so that consequently they must needs be blind.

Eutropius. Marcus Tullius Cicero. Apulia.

Eutropius sheweth, that the same day in which *Marcus Tullius Cicero* was born, a certain Virgin of *Rome* riding into *Apulia*, was stricken with

Lightning, ſo that all her garments being taken from her without any rending, ſhe lay ſtark naked, the laſing of her breaſt being undone, and her hoſe-garters untyed, yea her bracelets, collars, and rings, being all looſed from her: Likewiſe her horſe lay dead, with his bridle and girts untyed.

The wounds of Lightning, cold.

The places of them that are burnt with Lightning, are colder than the reſt of their bodies, either becauſe the greater heat draweth away the leſſer, or elſe becauſe that by the great violence, the vitall heat is quite extinguiſhed in that place.

Sea-Calf not hurt with Lightning.

The Sea-Calf is never hurt with Lightning: wherefore the Emperors Tents were wont to be covered with their skins.

Bayes and Box Trees ſeldome hurt with Lightning.

The Bay Trees and Box Trees are never, or ſeldome ſtricken with Lightning. The Cauſe of theſe may be the Hardneſs of their Skinne, which hath ſo few Poro-holes, that the Exhalation cannot enter into them.

The Eagle, Jupiters harneſs-bearer.

The Eagle alſo among Fowls, is

not

not ſtricken with Lightning; Wherefore the Poets feign, that the Eagle carrieth *Jupiters* Armour, which is Lightning. The Reaſon may be the thickneſs and drineſs of her feathers, which will not be kindled with ſo ſwift a fire.

Of Storm-Winds.

A Storm-Wind is a thick Exhalation, violently moved out of a Cloud, without inflammation or burning. Storm winds.

The Matter of this Storm is all one with the Matter of Lightning, that hath been ſpoken of: namely, it is an Exhalation very hot and dry, and alſo groſs and thick, ſo that it will eaſily be ſet on fire, but then it hath another name and other Effects.

The Form or Manner of the generation is ſuch,

When abundance of that kind of Exhalation is gathered together within a Cloud, which needs will have one way out or other, it breaketh the Cloud and cauſeth Thunder, as it hath been

taught before: but if the matter be very thick, and the Cloud somewhat thin, then doth it not rend the Cloud, but falling down beateth the Cloud before it, and so is carried as an arrow out of a bow.

It doth alwayes go before a great sudden shower: For when the Cloud is broken, the water must needs fall down. Also it is so gross and so thick, that it darkneth the Air, and maketh all the Lowest Region of the Air to be in a manner as a dark Smoaky Cloud.

It causeth Tempests in the Sea, and Wonderfull great Danger to them that bear Sail, whom if it overtake, it bringeth to utter destruction.

So sudden is this kind, that it cannot be resisted with sudden help: so violent it is, that feeble force cannot withstand it.

Finally, It is so Troublesome with Thunder, Lightning, Rain, and Beats, besides these, Darkness and Cold, that it would make men, as so neer a Pinch, to be at their Wits End, if they were not accustomed

med to ſuch Tumultuous Tempeſts.

Wherefore it were profitable to declare the Signs that go before it, to the End Men might beware of it.

But they are ſo common to other Tempeſts, that either they are known well enough, or elſe being never ſo well known, in a Seldom Calamity they would little be feared.

The Sea-ſhips ſubject to more Danger, have more Help, if it be uſed in Time: But no Signs foreknown can profit the Dweller on the Land, to keep his Houſe from Ruine, except it were to ſave his Life from the fall of his Manſion.

The ſudden violence of this Tempeſt to him is more ſeldom times, but more incurable when it cometh, than to the Mariner, who hath ſome Aid to look for by his coming: the other if he eſcape with his life, may comfort himſelf that he was near a great danger, and caſt with himſelf to build up his Houſe again.

Of Whirlwinds.

Whirle-winds.

A Whirlwind is a Wind breaking out of a Cloud, Rouling or Winding round about, overthrowing that which ſtandeth near it, and that which cometh before it, carrying it with him aloft in the Air.

It differeth from a Stormy Wind in three points.

Firſt, in the Matter, which is leſs in Quantity, and of thinner Subſtance.

Secondly, in the Moving, which is Circular, Winding about: whereas the Storm bloweth aſlope and Sidelong. Alſo a Whirlwind in the Moving divideth not it ſelf abroad, and bloweth Directly, as the Storm doth.

And Thirdly, in the manner of the generation, for a Storm doth always come out of one Cloud; but a Whirlwind ſometime is Cauſed by means of two Contrary Winds that meet together.

In

In likemanner, as we see in the streets of Cities, where the wind is beaten back from two walls, meeting in the midst of the street, there is made a little whirlewind, which whisking round about, taketh up the dust, or straws, and bloweth it about, after the very similitude of the great and fearfull whirlewind.

The reason of the going about is this, that when the walls beat back the wind from them, which aboundeth in that place, and those winds when they meet, by reason of equall force on both sides, can neither drive one the other back again, nor yet pass thorow one the other; it must needs be, that they must both seek a way on the side at once, and consequently be carried round about, the one as it were pursuing the other, untill there be space enough in the air, that they may be parted asunder.

The matter of a whirlewind is not much differing from the matter of storm and lightning, that is, an *Exhalation* hot and dry, breaking out of a cloud in divers parts of it, which causeth the blowing about. Also it is caused,

sed, as it hath been said, by two, or more winds, blowing from divers places, which may be of particular causes, that have been shewed before in the Chapter of winds; this tempest is noisome to man and beast, Sea and Land, things living, and life lacking. For it will take up both men and beasts, stones and clods of earth: which when it hath born a great way, will not be so courteous as to set them down again, but negligently letteth them fall from a great height, or else violently throweth them down to the earth.

The troubles of whirlewinds.

It breaketh Trees, winding them about, and pulling them up by the roots. It turneth about a Ship, and bruiseth it in pieces, with other mischiefs besides.

Of fired Whirlewinds.

Fired whirlewinds.

SOmetime a whirlewind is set on fire within the clond, and then breaking forth, flieth round like a great Cart-wheel, terrible to behold, turning and overthrowing all dry things that it cometh near, as Houses, Woods, Corn, Grass, and whatsoever else standeth in the way. It

It differeth not from a whirlewind, saving that it is kindled and set on fire, so appearing, else the generation of both is called one.

Of Circles.

THe Circle called *Halon* is a garland of divers colours, that is seen about the Sun, the Moon, or any other Star, especially about *Jupiter* or *Venus*, for their great brightnes. It is called of the Greeks a compassed plat, of the Latines, a Crown or Garland.

Circles about the Sun, the Moon, and other Stars, Jupiter & Venus Planets.

The matter wherein it is made is a cloud of equall thicknes, or thinnes, coming directly under the body of the Sun, the Moon, or other Stars, into which the light of the heavenly body is received, and so appeareth round, because the Star is round: as a stone cast into the water maketh many round circles, dilating in breadth, untill the violence of the moving is ended, so is it in the air; the light beams piercing it, cause broad circles to be dilated, which appear white, purple, black, red, green, blew, and other colours, according

Circles in the water.

The colours of circles.

cording to the disposition of the clouds matter. The cause of such colours is shewed before, in the peculiar treaty of colours.

This circle is oftner seen about the Moon, than about the Sun, because the heat of the Sun draweth the *vapors* too high, where it cannot be made. Also, because the night is a more quiet time than the day from wind, it is more often in the night, than in the day. Seldome about other Stars, because their light beams are too weak often to pierce a cloud: yet oftner about smaller Stars than the Sun, because the light of the Sun pierceth the cloud more forcibly, than that this *Halos* can many times be cause.

Circles about a candle.

Otherwhiles it is seen about a candle, which must be in a very thick and gross air, of such proportionate thickness, that it may receive the light, as the cloud doth from the Stars, as in the smoaky places, or hot houses.

This kind of circle is sometimes like a Rainbow, saving that it is a whole circle, unless the Star under which it is caused, be not all risen, or else

else the cloud, in which it is seen, be not all come under the Star, or after it hath come under some part thereof, be dissolved from the rest. The signs of these Circles.

These Circles be signs of tempests and winds, as witness both *Virgil*, and *Aratus*. Virgilius, Aratus, Poets.

The Wind shall blow from that quarter, where the Circle first beginneth to break. The cause whereof is this, that the Circle is broken by the Wind that is above, which is not yet come down towards us, but by this effect above, we may gather both that it will come, and also from what quarter.

A great Circle about the Moon, betokeneth great cold and frost to follow after. Sign of frost.

But if it vanish away and be dissolved altogether, it is a sign of fair weather. Sign of fair weather.

If it be broken in many parts, it signifieth tempest. Sign of tempest.

If it wax altogether thicker and darker, it is a forewarning of rain. Sign of rain.

One alone, after *Ptolomie*, pure and white, vanishing away by little and little, is a token of fair weather. Ptolomeus Sign of fair weather.

Two

Two or three at once portendeth tempeſt: if they be ruddy, they ſhew wind to come; and toward ſnow, they ſeem as it were broken and rocky.

Sign of Snow.

Being dark or dim they ſignifie all theſe foreſaid events, with more force and abundance: it is oftner cauſed in *Autumn* and Spring, than in Winter or Summer: the cauſe is the temperateneſs of the time.

The cauſe why it appeareth ſometime greater, and ſometime leſſer, is in the quality of the matter, which as it is groſs or thin, will more or leſs be dilated and ſtretched abroad, and alſo, as ſome will have it, of the weakneſs of mans ſight. Of which, *Ariſtotle* bringeth an example in one *Antipho*, which did alwayes ſee his own image before him in the air, as in a glaſs: which he affirmeth to have been for the weakneſs of his ſight-beams, that could not pierce the air, ſo that they were reflected again to himſelf.

Ariſtotle. Antipho.

And thus much for *Halos*, and the cauſes, ſigns, or tokens of it.

Of

Of the Rainbow.

THe Rainbow is the apparition of certain colours in a cloud, oppofite againſt the Sun, in faſhion of half a Circle. *Poſſidonius* ſaid, it was the Suns looking glaſs, wherein his image was repreſented, and that the blew colour was the proper colour of the cloud; red of the Sun; all the other colours of commixtion. Rainbow. Poſſidonius.

It differeth manifoldly from *Halos*: for the Rainbow is alwayes oppoſite againſt the Sun: but *Halos* is directly under it.

They differ not only in place, but alſo in faſhion: the Rainbow is but half a Circle: the *Halos* is a whole Circle.

Likewiſe they vary in colour: for the Rainbow is more dim, and of purple colour; the *Halos*, whiter and brighter.

Alſo, in continuance; for the Rainbow may continue longer than *Halos*.

The image of the Rainbow may be ſeen on a wall, the Sun ſtriking thorow a ſix-pointed ſtone, called *Iris*, or any A precious ſtone called Iris.

any other Christall of the same fashion; also thorow some glass window.

Halon is seen about Candles, in smoky places, as are baths and kitchings.

The manner of the generation of the Rainbow is such: There is opposite against the Sun a thick watery cloud, which is already resolved into dewy drops of rain, is (for a gross similitude) seen on the pothid, when the Water in the Vessel hath sodden, or is very hot, the lid will be all full of small drops of water, which come from the water in the Vessel; first, by heat resolved into smoak, after, when it cannot go at large, it is resolved again. Wherefore upon such a cloud, the Sun beams striking as upon a smooth glass, do express the image of the Sun unperfectly, for the great distance. Or else the Sun beams striking into a hollow cloud, where they are refracted or broken, and so come to the eyes of him that beholdeth the Rainbow.

A similitude.

The similitude thereof is seen, when men sail or row in Boats, the Sun shineth upon the water, which casteth on the vessels side the colours and image of the Rainbow. Like-

The similitude of the Rainbow.

Likewiſe, water in an urinall holden againſt the Sun, receiveth the light, and ſheweth colours on the wall.

There be two kinds of Rainbows, one of the Sun, another of the Moon; the one by day, the other by night: the Rainbow of the Sun often, but of the Moon very ſeldome, in ſo much that it can be but twice in fifty years, and that when the Moon is in the Eaſt or Weſt, full in perfect oppoſition. Rainbow of the Sun. Rainbow of the Moon.

It hath not been many times ſeen ſince the writing of Hiſtories, yet ſometimes, and for the rareneſs, is taken for a great wonder. Yet is it in colour nothing ſo beautifull as the Suns, but for the moſt part white as milk: other diverſities of colours are ſcant perceived. When it appeareth, it is ſaid to ſignifie tempeſt.

The time of the Rainbow is often after the point of *Autumn*; both for the placing of the Sun in competent lowneſs, and alſo for abundance of matter, ſeldome or never is the Rainbow ſeen about the midſt of Summer.

There may be many Rainbows at one time, yet commonly but one principall,

cipall, of which the reſt are but ſhadows and images; the ſecond ſhadow of the firſt, the third of the ſecond, as appears by placing of their colours.

It remaineth to ſhew why it is but half a circle, or leſs, and never more; and why the whole cloud receiveth not the ſame colours that the Rainbow hath. The cauſe of the firſt is, becauſe the center or middle part of the Rainbow, that is *Diametrally* oppoſite to the center of the Sun, is alwayes either in the *Horizon* (that is, the circle cutting off our ſight of Heaven by the earth) or under it. The cauſe why the whole cloud is not coloured, is, becauſe that in the midſt the beams, as ſtrong, pierce thorow, but on the edges where they are weaker, they are reflected or refracted.

Now for ſo much as GOD made the Rainbow a ſign and Sacrament of the promiſe, ſome think it was never ſeen before the flood: their reaſon may be this, that the earth after the firſt creation was then ſo fruitfull, that it needed none or very little Rain, ſo that ſuch dark clouds were not often gathered,

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the fruitful ground not so easily remitted his moisture, that then was fat and clammy, hard to be drawn up: so it might be that there was no Rainbow before, as we cannot find that ever it rained before. But whether it were or not, it is certain that then it became a Sacrament, whereas it was none before: which when we behold, it behoveth us to remember the truth of God in all his promises, to his glory and our comfort.

The milky way, called of some the way to St. James, and Watling Street.

THe milkyway is a white circle seen in a clear night, as it were in the firmament, passing by the signs of *Sagittarius* and *Gemini*. The white Circle seen in the night.

The cause thereof is not agreed upon among Philosophers, whose opinions I thought best to report, before I come to the most probable causes.

First of all, *Pythagoras* is charged with a Poeticall fable, as though it had been caused, by reason that the Sun did Pythagoras

once run out of his path-way, and burned this part, whereof it looketh white.

Anaxagoras. Democritus.

Others, as *Anaxagoras* and *Democritus* said, that it was the light of certain Stars, shining by themselves, of their own light, which in the absence of the Sun might be seen. But this opinion is also false; for the Stars have no light of themselves, but of the Sun: also if it were so, it should appear about other Stars.

Cardanus.

Democritus is also reported to have said, that it was nothing else but innumerable little Stars, which with their confuse light caused that whiteness: to this opinion *Cardane* seemeth to subscribe.

Phaeton.

The Poets have four fables of it: one of *Phaeton*, which on a time guided the Chariot of the Sun, and wandring out of the way did burn that place, wherefore of *Jupiter* he was stricken down with lightning.

Ovid. Metr. Pr.

The second, That it is the high street in Heaven, that goeth straight to *Jupiters* palace, and both sides of it the common sort of gods do dwell.

Hebe.

The third, that *Hebe*, one which was

Jupi-

Jupiters Cupbearer, on a time ſtumbled at a ſtraw, and ſhed the Wine or Milk that was in the Cup, which coloured that part of Heaven to this day: wherefore ſhewas put out of her office.

The fourth, That *Apollo* ſtood there to fight againſt the Giants, which *Jupiter* made to appear, for a perpetuall memory. Apollo.

Theophraſtus, a Philoſopher, affirmed, That it was the joyning together, or ſeam of the two half Globes, which made it appear more light in that place than in others. Theophraſtus.

Others ſaid, it was the reflexion of the ſhining light of fire or ſtar light, as it is ſeen in a glaſs, but then it ſhould be moveable.

Diodorus affirmed, that it was Heavenly fire, condenſed or made thick into a circle, and ſo became viſible, whereas the reſt, for the pureneſs, clearnes, & thinnes, could not be ſeen. Diodorus.

Poſſidonius, whoſe mind to many ſeemeth very reaſonable, ſaid, it is the infuſion of the heat of the Stars, which therefore is in a Circle, contrary to the Zodiack, (out of which the Sun never Poſſidonius. Zodiack.

wandereth) becauſe it might temper the whole compaſs with vital and lively heat; although in my mind he hath rather expreſſed the finall cauſe, than the efficient.

Ariſtotle. *Ariſtotles* opinion is, that it ſhould be the beams of a great Circle which is cauſed by a cloud or *Exhalation*, drawn up by thoſe Stars which be called Sperades. *Sperades*. This opinion of *Ariſtotle* is miſliked of moſt men that have travailed in this ſcience; and worthily: For if it were of the nature of elements, as *Exhalations* are, it would be at length conſumed. But this circle never corrupteth, therefore it is not of *Exhalations*. Alſo it neither encreaſeth nor diminiſheth, which is a plain proof that it conſiſteth not of elemental matter, although *Ariſtotle* ſeem to make a double circle, one celeſtial, another elemental.

The laſt opinion is, of them that ſay it is the nature of Heaven, thicker in ſubſtance than other parts of Heaven be, having ſome likeneſs to the ſubſtance of the Moon, which being lightned by the ſame, as all the Stars be,

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appeareth white. And this opinion I take to be moſt probable, becauſe that ſentence of Star light ſeemeth not ſo reaſonably, to be only in that place, and not elſewhere.

The finall cauſe of this Milk-white circle, hath been already touched in the opinion of *Poſſidonius*, whereunto alſo *Plinius* in the 18. Book, and 29. Chapter of his naturalHiſtory agreeth, affirming, that it is very profitable for the generation and fruitfull encreaſe of things that grow on the earth. Poſſidonius. Plinius.

The *Mathematitians* that have meaſured the breadth thereof, affirm, that toward the north it paſſeth over the Ecliptical line of the ninth ſphear, from the 18. degree of *Gemini*, unto 2. degrees of *Cancer*, which is 13. degrees, and toward the South, from the 8. degree of *Sagittarius*, to the 13. degree of the ſame ſign: and becauſe it is there divided into two branches (as may eaſily be ſeen in a clear night) it reacheth from 24. of *Sagittarius*, to the 2. degree of *Capricorn*. The breadth of this circle.

This circle, if it be of the nature of Heaven, is unproperly placed among

Meteors or impressions: but because of *Aristotles* mind, who will have it to be an impression kindled, and their opinion which think it proceedeth of the light of Stars, it is not without good cause in this place treated of.

Of beams, or streams of light, appearing thorow a Cloud.

Beams or streams.

THere is yet another kind of impression caused by the beams of the Sun, stricken through a watery cloud, being of unequall thinness, and is thinner in one part than in another, so that it cannot receive the beams in any other form, than that they appear direct, or sloped downward of divers colours; and the same that are the colours of the Rainbow, though not so evident, because the reflexion is not so strong. They vary in colours: some are more purple or ruddy, when the cloud is thicker; some yellow and whitish, when the cloud is thinner, and so other colours are caused likewise, whereof you may read the proper cause

in the colours of clouds, and other like parts of this Treatise.

The common people call it the descending of the holy Ghost, or our Ladies *Assumption*, because these things are painted after such a sort. Others say that it is rain, striking down in another place, as though they could see the drops falling. And they are not altogether deceived, but in the time; for soon after it will rain, because this impression appeareth out of a watry cloud. They are called by divers names, as Rods, Wands, Cords of Tents, unto which they are not much unlike staves and little pillars, when they seem greater and thicker, many being joyned together.

The Rainbow, the Circles, and these light Beams, are all of one manner of generation, insomuch that if you divide the Circle, it shall be a Rainbow; if you draw it straight in length, it maketh streams or beams. Herein they agree, namely, in form and matter, but they differ in outward form, which we may call fashion, as the one is round, the other half round, and the third

direct, ſtraight, or falling aſlope. Alſo they differ in place about which they ſtand: for ſtreams are only about the Sun; Rainbows about the Sun often, and ſeldome about the Moon; but circles both about the Sun and the Moon, and alſo about any other of all the Stars, yet rather and oftner about bright Stars.

To make an end of theſe ſtreams, they appear diverſly, after the faſhion and place wherein the cloud hangeth, in reſpect of the Sun; for ſometime they are ſeen only in the edge of a cloud, all the breadth of that cloud: ſometime thorow the midſt of a cloud, being thinner there than in other parts and then they are ſpread round about like a tent or pavilion uſed in War. They are moſt commonly ſeen in ſuch times as there is great abundance of rain, which they by their apparition do ſignifie not yet to be ended.

And thus much concerning direct light beams, called Rods, &c.

Of

Of many Suns.

IT is ſtrange and marvellous to behold the likelihood of that, which *Alexander* the Great, ſending word to *Darius*, ſaid to be impoſſible, that Two Suns ſhould rule the World. But oftentimes, men have ſeen, as they thought, in the firmament, not only two Suns, but oftener three Suns, and many more in number, though not ſo often appearing. Theſe, how wonderfull ſoever they appear, proceed of a naturall cauſe, which we will endeavour to expreſs. They are nothing elſe but Idols or Images of the Sun, repreſented in an equall, ſmooth, and watry cloud, placed on the ſide of the Sun, and ſometimes on both ſides, into which the Sun beams being received, as in a glaſs, expreſs the likeneſs of faſhion and light that is in the Sun, appearing as though there were many Suns, whereas indeed there is but one, and all the reſt are images.

Many Suns at once. Alexander the great. Darius.

This thick and watery cloud is not ſaid to be under the Sun; for then it would

would make the Circles, called crowns or garlands: it is not oppoſite to the Sun, for then would it make the Rainbow: but it is ſaid to be on the ſide where the image may be beſt repreſented. Alſo it may not be too far off, for then the beams will be too feeble to be reflected: neither yet too near; for if it ſo be, the Sun will diſperſe it: but in a competent and middle diſtance: for ſo repreſentation of many Suns is cauſed.

They are moſt often ſeen in the morning and evening, about the riſing or going down of the Sun, ſeldome at noon time, or about the midſt of the day, becauſe the heat will ſoon diſſolve them: yet have there been ſome ſeen, which began in the morning, and continued all the day long, unto the evening. Sometimes there appear many little Suns, like unto little Stars, which are cauſed after the ſame ſort, as we do ſee a mans face to be expreſſed in all the pieces of a broken glaſs. So when the cloud hath many ſeparations, there appear many Suns, on one ſide of the true Sun, ſometimes great and ſometimes

Many ſmal Suns like Stars. Similitude

times little, as the parts of the cloud ſeparated are in quantity.

They do naturally betoken tempeſt and rain to follow, becauſe they cannot appear but in a watery diſpoſition of the Air. The ſignification of many Suns.

Alſo, if they appear on the South-ſide of the Sun, they ſignifie a greater tempeſt, than if they appear on the North-ſide. The reaſon is alleadged, becauſe the Southern *Vapor* is ſooner reſolved into Water than is the Northern.

For a ſupernaturall ſignification, they have oftentimes been noted to have portended the contention of Princes of Kingdomes: As not long before the Contention of *Galba*, *Otho*, and *Vitellius*, for the Empire of *Rome*, there appeared three Suns. Alſo of late, toward the ſlaughter of *Lewis* King of *Hungary*, were ſeen three Suns, betokening three Princes that contended for the Kingdome, namely *Ferdinando*, ſince Emperor, *John Vayvode*, and the great Turk. Galba, Otho, and Vitellius.

Of

Of many Moons.

Many Moons.

AFter the treaty of many Suns, it were not hard for any man without farther instruction, to know the natural Cause of many Moons; For they are likewise Images of the Moon, represented in an equall Cloud, which is watery, smooth and polished, even like a glass.

Plinius.

Some call them (as *Plinius* saith) night-Suns; because they, joyned with the light of the true Moon, give a great shining light, to drive away the shadow and darkness of the night.

It were superfluous to write more of their Causes or Effects, which are all one with those that have been declared of the Suns.

Why other Stars are not so represented.

It may be doubted why the other Stars do not likewise express their image in watery Clouds; and so the number of them as to our sight should be multiplied.

It may be Answered, that their light or beams are too feeble & weak, to express any such similitude or likeness in the

the watry Clouds. For although they have garlands or circles about them, that are cauſed in a Vapour that is under them, yet it is manifeſt that this Apparition hath not need of ſo ſtrong a light, as is required to print the images of them in the Clouds. Again, the Garlands are direct under, and therefore apter to receive ſuch Apparition.

It may be again Objected, that the Stars have their Image perfectly and ſufficiently expreſſed in glaſſes here on the Earth; yea and at the day-time, when their light is either none, or moſt feeble and weak: as we ſee it is uſed at Midſummer, to behold that great Star called *Syrius* in a glaſs, even at Noon-dayes. Objection. Syrius a great Star ſeen at noon in Summer.

Alſo we ſee every night the image of the Stars in calm and quiet ſtanding waters: then what ſhould let but that their images might alſo be expreſſed in watry Clouds?

Hereto may be anſwered, that the Let is in the Cloud, which is neither ſo hard as is the glaſs, nor yet ſo continuall as is the water, but conſiſteth of An Anſwer.

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innumerable ſmall drops: ſo that except the light of the Stars were ſtronger, it can in them expreſs no uniform images of them, as it doth in glaſſes and in the water. Notwithſtanding, in Writers of Wonders we read ſome ſuch like thing ſometime to have chanced:

There hath been often ſeen many Suns in the day-time, and after the Sun ſetting: at the riſing of the full Moon, there have appeared many Moons, which was by this means, that the ſame Cloud that received the Sun-beams in the morning, tarried in the ſame place, and at the Moons riſing was ready alſo to receive her image.

Of Wonderfull Apparitions:

Wonderfull apparitions.

WE will cloſe this Book with a brief declaration of the natural Cauſes of many things that are ſeen in the Air, very wonderfull and ſtrange to behold, which in theſe latter Years have been often ſeen and beheld, to the great admiration of all men, not without the ſingular providence of God, to fore-

forewarn us of many dangers that hang over us in these most Perillous Times.

The apparitions of which, as it is most wonderfull, so the searching of the Cause to us is most difficult: a great deal the rather, because no man hath hitherto enterprised (to my knowledge) to seek out any cause of them, but all men have taken them as immediate miracles, without any naturall mean or cause to proure them.

And I truly do acknowledge that they are sent of God as wonderful signs to declare his Power, and move us to amendment of life; indeed miraculous, but not yet so that they want a natural cause; for if they be well weighed and considered, it is not hard to find that they differ much from such Miracles as are recorded in the Scripture, and admitted of Divines. So that as I abhor the Opinion of *Epicurus*, to think that such things come by Chance, but rather by the determined purpose of Gods providence: so I consent not with them, that suppose when any thing is derived from any naturall cause,

God

God the chief and beſt Cauſe of all things is excluded.

Some of theſe Wonderfull Apparitions conſiſt of Circles and Rainbows, of divers faſhions and placings, as one within another, the edge of one touching another, one dividing or going thorow another, with like placing of ſmall Circles about great Circles, or parts of ſmall Circles, ſome with the ends upward, ſome downward, ſome aſide, and ſome acroſs; but all for the moſt part in uniform order, conſtituted or placed for the order of them pleaſant to behold, but for the ſtrangeneſs ſomewhat fearfull. Such a like Apparition is made with the Suns or Moons images, joyned unto theſe Circles, ſet alſo in good and uniform order.

The cauſe of all theſe is the meeting together of all thoſe ſeverall Cauſes that make the Circles, Rainbowes, Streams and Images of the Sun or Moon, which joined all together, make the wonderfull ſight of Rainbows, poſitions of Circles, Croſſes, and divers Lights, which pertain to the knowledg of *Optice* and *Catoptrice*, that teach

Optice. Catoptrice

how

ow by divers refractions and reflections of beams such visions are caused. So that he which will know how they are generated, must return into the several Treatises of Rainbowes, Circles, Streams, & Images of the Sun or Moon: and if in them he find not knowledge sufficient to instruct him, I must send him to the Demonstrations of Perspective, where he shall want nothing.

Another sort of them, no less often beheld within these few years than the former, but a great deal more strange and wonderfull to look upon, are the Sights of Armies fighting in the Air, of Castles, Cities, and Towns, with whole Countries having in them Hills, Vallies, Rivers, Woods, also Beasts, Men, and Fowls, Monsters, of which there are no such kinds on the Earth, and finally all manner of things and actions that are on the Earth, as Burials, Processions, Judgments, Combates, Men, Women, Children, Horses, Crowns, Armes of certain Noble men and Countries, Weapons of all sorts, sometimes Stars, Angels, as they are painted with the Image of Christ crucified,

fied, beſieging of Caſtles and Towns, many things and geſtures done by men or beaſts, the very ſimilitude of Perſons known to the Beholders; as of late was ſeen the very Image of the Emperor *Charles*, inſomuch that they which beheld it, put off their Caps, thinking verily it had been he: and of *John Frederick*, Prince Elector of *Saxony*, who at that time was Priſoner with the Emperor: Alſo the Image of ſmall Croſſes, which hath been not only in the Air, but alſo on the Earth, on mens apparell, on diſhes, platters, pots, and all other things, ſo that the Jews have been full angry, that they could neither waſh nor rub them out of their apparell. In *Germany* alſo Fires, and many ſuch things, as it were long ſtories ſeen in the Air.

All theſe wonderfull Apparitions may be cauſed two manner of waves; the one Artificially, the other Naturally.

Artificially, by certain glaſſes and Inſtruments, made according to a ſecret part of that knowledge which is called Catoptrice *Catoptrice*; and ſo peradventure ſome of

of them have been cauſed; but

The moſt part (doubtleſs) Naturally, when the diſpoſition of the Air hath been ſuch, that it hath received the image of many things placed and done on Earth.

And becauſe it is apt to receive divers images, as well in one place as in another, theſe monſtrous forms, and ſtrange actions, or ſtories, proceed of the joyning of divers forms & actions; as if two Hiſtories were confuſedly painted in one, the whole Picture would be ſtrange; or (as the Poet ſaith) if a Painter to a mans head ſhould ſet a horſes neck, and after, divers feathers. Horatius.

Sometimes alſo one image is multiplyed in the Air into many or infinite, as are letters and croſſes which fill the Air, even beneath; And the light of the Sun received into little parts, maketh to appear as it were many ſmall Stars.

Let this ſuffice concerning theſe wonderfull Apparitions, once again admoniſhing the Reader, though I have enterpriſed to declare theſe by naturall Reaſon, yet verily believing that not ſo much as one Sparrow falleth to the

ground without Gods providence. I do also acknowledge Gods providence bringeth these to pass, to such ends as before I have shewed, using these causes as means and instruments to do them.

THE FOURTH BOOK.

Of Watery Impressions.

THose be Watery Impressions that consist most of Water.

In the Treaty of them are wont to be handled these Impressions, namely, Clouds, Rain, Dew, hoar Frost, Hail, Snow, Springs, and the great Sea it self.

Of

Of Clouds.

A Cloud is a Vapor cold and moiſt, drawn out of the Earth and Waters by the heat of the Sun, into the middle region of the Air; where by cold it is ſo knit together, that it hangeth untill either the weight or ſome reſolution cauſeth it to fall down. Clouds.

The place wherein the Clouds do hang, is ſaid to be in the middle region of the Air, becauſe men ſee it is neceſſary that there ſhould be a cold, which ſhould make thoſe Vapors ſo groſs and thick, which for the moſt part are drawn ſo thin from the Earth, that they are inviſible as the Air is.

And although they are known often times, as *Ariſtotle* witneſſeth, to be in the loweſt region of the Air, near to the Earth, inſomuch that ſometimes they fall down to the Earth with great noiſe, to the great fear of men, and no leſs loſs and danger; yet may it be reaſonably thought that theſe Clouds were generated in the middle region of Ariſtot.

the Air far distant from the Earth, which by their heavineſs do by little and little ſink down lower into the loweſt region, and ſometimes alſo fall down to the Earth.

The height of the Clouds.

The common Opinion is, that they go not higher than nine mile; which becauſe it leaneth to no reaſon, is uncertain.

Albertus Magnus,

Albertus Magnus whoſe reaſon alſo is to be doubted of, affirmeth, that the Clouds do ſcarce exceed three miles in height when they are higheſt.

And ſome let not to ſay, that oftentimes they aſcend not paſt the half of one mile in height.

Again, Others pretending to finde out the truth by Geometricall Demonſtrations, make it above fifty mile to the place where the generation of Clouds is.

How theſe men take the diſtance from the Earth, it is uncertain: whether that they aſſign the leaſt diſtance, and mean it from the higheſt parts of the Earth, as are hill tops, or from the common plain.

Again, whether they that aſſign the higheſt

higheſt diſtance to be from the loweſt valleys of the Earth, or from the hill tops.

The Reaſon before ſhewed moveth me to think that the moſt uſuall and common generation, I mean the condenſation or making thick of theſe thin Vapors into clouds, is in the middle region of the Air: but for the diſtance of the clouds when they be generated, I think they be ſometime nine mile, ſometime three mile, ſometime half a mile, and ſometime leſs than a quarter of a mile from the Earth.

Of Miſts.

THere be two kinds of Miſts; the one aſcending, the other deſcending. Miſts.

That which aſcendeth, goeth up out of the Water or the Earth as Smoak, but doth not commonly ſpread over all other parts: it is ſeen in Rivers and moiſt places.

The other Miſt that goeth down toward the Earth, is when any Vapor is

lifted up into the Air, by the heat of the Sun, which being not ſtrong enough to draw it ſo high that the cold may knit it, ſuffereth it after it is a little made thick, to fall down again, ſo it filleth all the Air with the groſs Vapors, and is called Miſts, being uſually a ſign of fair Weather.

Of empty Clouds.

Empty clouds.

THere be certain Clouds that are empty, and ſend no Rain, they come of two ſorts.

One ſort are the remnants of a Cloud that hath rained, which cannot be converted into water for their drineſs.

Another ſort is of them that are drawn up out of wet and dry places, and be rather Exhalations than Vapors; that is, they be dry, hot, and light, ſo that it were hard for them to be turned into Rain: they look white like flocks of wooll, when the light ſtriketh into them.

There be alſo empty Clouds, which when the Winds have diſperſed abroad any

any Cloud, are ſcattered over all the ſky: but theſe Clouds though for a time they be empty, yet becauſe they conſiſt of ſuch a ſubſtance as is watry, they may be, and are oftentimes gathered together, and give plentifull Rain.

Of the colours of Clouds we have ſpoken in the Second Book of Fiery Meteors, where thoſe Colours and the cauſes of them are deſcribed, which ſeem to be Fiery, or may be thought to be Inflammations or burnings, as to be Red, Fiery and Yellowiſh. Of the colours of Clouds.

But beſides thoſe there be White, Black, Blew, and Green.

White clouds be thin, and not very watry, ſo that the light received in them, maketh them to appear White.

Black clouds be full of thick, groſs, and earthly matter, that makes them look ſo dark.

Blew clouds be full of thick droſs, and earthly, as the Black: ſo the light received in them, maketh them to ſeem Blew.

Green clouds are altogether watry, reſolved into water, which receiving into

into them the night, appear Green as Water doth in a great Veſſell, or in the Sea and Rivers.

Of Rain.

Rain. AFter the generation of clouds is well known, it ſhall not be hard to learn from whence the Rain cometh.

For after the matter of the cloud being drawn up, and by cold made thick (as is ſaid before) heat following, which is moſt commonly of the Southern wind, or any other wind of hot temper, doth reſolve it again into Water, and ſo it falleth in drops, to give encreaſe of fruit to the Earth, and move men to give thanks to God.

There be ſmall ſhowers of ſmall drops, and there be great ſtorms of great drops.

The ſhowers with ſmall drops, proceed either of the ſmall heat that reſolveth the clouds: or elſe of the great diſtance of the clouds from the Earth.

The ſtreams with great drops, contrariwiſe,

trariwiſe, do come of great heat, reſolving or melting the cloud, or elſe of ſmall diſtance from the Earth. Whereof we ſee a plain experiment, when Water is poured forth from an high place, the drops are ſmall; but if it be not from high, it will either have no drops, or very great.

The cauſe why rain falleth in round drops, is both for that the parts deſire the ſame form that the whole hath, which is round; and alſo that ſo it is beſt preſerved againſt all contrary qualities: like as we ſee Water poured upon dry or greaſie things to gather it ſelf into roundels, to avoid the contrariety of heat and drineſs.

Why rain water is not ſalt.

It is not to be omitted, that rain Water, although a great part of it be drawn out of the Sea, yet moſt commonly it is ſweet not ſalt.

The cauſe is, becauſe it is drawn up in ſuch ſmall *Vapors*, and that ſalt part is conſumed by the heat of the Sun.

The rain Water doubtleſs doth more encreaſe and cheriſh things growing on the Earth, than any other Water wherewith they may be Watered, becauſe the rain

rain Water retaineth much of the Suns heat in it, that is no ſmall comfort to all growing plants. The Water that cometh from Heaven, in rain, will ſooner come to putrifaction, or ſtinking, than any other, becauſe it hath been made very ſubtile by heat, and alſo for that it is mixed with ſo many earthly and corruptible ſubſtances.

Avicen. Rain water, that falleth in the Summer, by *Avicens* judgement, is more wholeſome than other Water, becauſe it is not ſo cold and moiſt as other Waters be, but hotter and lighter.

Salt rain. Sometime there is ſalt rain, when ſome *Exhalation* which is hot and dry, is commixed with the *Vapor*, whereof the rain conſiſteth.

Bitter rain Sometime it is bitter, when ſome burnt earthly moiſture is mixed with it.

This rain is both unwholeſome, and alſo unfruitfull in theſe countreys: there is great ſtore and plenty of rain, becauſe the Sun is of ſuch temperate heat, that it gathereth many *Vapors*, and by immoderate heat doth not conſume

ſume them. But in the Eaſt parts, in ſome hot Countreys, it never or ſeldom is ſeen to rain, as in *Egypt* and *Syria*, but in ſtead of rain, *Egypt* hath the River *Nilus*, whoſe overflowings do marvellouſly fatten the Earth. In *Syria* and other like Countries they have more plentifull dew than we have, which doth likewiſe make their Earth exceeding fruitfull. The River Nilus.

Seneca teſtifieth that the Rain ſoaketh no deeper into the Earth than ten foot deep. Seneca.

Of the Signs of Rain.

Signs of Rain.

FIrſt, If the Skie be red in the morning, it is a token of Rain, becauſe thoſe Vapors which cauſe the redneſs, will be ſhortly reſolved into Rain.

If a dark cloud be at the Sun riſing, in which the Sun ſoon after is hid, it will diſſolve it, and rain will follow.

If then appear a cloud, and after *Vapors* are ſeen to aſcend up to it, that betokeneth rain.

If the Sun or Moon look pale, look for rain.

If

If the Sun in the East seem greater than commonly he appeareth, it is a sign of many *Vapours* which will bring rain.

If the Sun be seen very early, or few Stars appear in the night, it betokeneth rain.

The often changing of the Winds, also sheweth tempest.

The most sure and certain sign of rain is the Southern wind, which with his warmness alwayes resolveth the clouds into rain.

When there is no dew at such times as by nature of the time there should be, rain followeth; for the matter of the dew is turned into the matter of watry Clouds.

If in the West, about the Sun setting there appear a black cloud, it will rain that night, because that cloud shall want heat to disperse it.

When much dust is raised up, and when the woods make a great noise, some tempest is towards.

Hard stones will be moist, and sweat against rain; lamps and candles by sparkling, frogs crying, Trees breaking,

breaking, leaves falling, and duſt clottering, forewarn us of tempeſt.

Fleas, Flyes, and Gnats, bite ſore toward a tempeſt, Kine feed greedily, Birds ſeek their victuals more buſily: for in the groſs Air diſpoſed to rain, their ſtomacks are hotter, and they more hungry. But theſe kind of ſigns pertain not ſo properly to *Meteorologie*, as to Mariners and Husbandry, which have a great many more than theſe. And *Virgil* in his firſt Book of *Georgicks*, hath a great number for them that liſt to learn. Wherefore let theſe hitherto ſuffice.

Of monſtrous or prodigious rain.

Of monſtrous Rain.

HItherto we have made mention only of naturall rain, and that which is common, which no man doth marvell at. But there is ſometime ſuch rain, that worthily may be wondred at: as when it raineth worms, froggs, fiſhes, blood, milk, fleſh, ſtones, wheat, iron, wooll, brick, and quickſilver. For Hiſtory maketh mention, that at divers times it hath rained ſuch things, whoſe

whose naturall cause for the most part we will go about to express, notwithstanding accounting them among such wonders, as God sendeth to be considered for such ends as we have before declared, Worms and Froggs may thus be generated: The fat *Exhalations* are drawn up into the Air, by a temperature of hot and moist; such vermine may be generated in the Air, as they are on the Earth, without copulation of male and female. Or else that with the Exhalations and Vapors, their Seed and Eggs are drawn up, which being in the clouds brought to form, fall down among the rain.

Worms & Frogs.

Likewise the spawn of fishes being drawn up, maketh fishes to rain out of the clouds. The vehement heat of the Sun in Summer, and specially in hot Countries, draweth milk out of the Paps of Beasts and Cattel, which being carried up in Vapors, and dissolved again into milk, falleth down like rain.

Fishes.

Milk.

After the same manner the Sun also from places where blood hath been spilt, draweth up great quantity of blood, & so it raineth blood. It

Blood.

It raineth fleſh, when great quantity of blood being drawn up, it is clotted together, and ſeemeth to be fleſh. Fleſh.

Avicen ſaith, that a whole Calf fell out of the Air; and ſome would make it ſeem credible, that of Vapors and Exhalations, with the power of heavenly bodies concurring, a Calf might be made in the Clouds. But I had rather think that this Calf was taken up in ſome ſtorm of Whirlwind, and ſo let fall again, than agree to ſo monſtrous a generation. Avicen.

It is a great deal more reaſonable, that ſtones of earthly matter gathered in clouds, ſhould be generated, as we ſaid before, of the Thunder-bolt. Yet ſome men think, that wind in Caves of the Earth breaking upward violently, carrieth before it earth and ſtones into the air, which cannot long abide, but fall down, and are counted among prodigious rain. Exhalations that be earthly and drawn out of clay, have much groſs ſubſtance in them, which gathered together, and by great heat burned in the clouds, make brick, which is no great marvell. Stones. Brick.

He that hath ſeen an Eggs-ſhel full of dew drawn up by the Sun into the Air, in a May morning, will not think it incredible, that Wheat and other Grain ſhould be drawn up in much hotter Countries than ours is, much rather the Meal or Flower which is lighter.

Wheat.

Wool.

A certain moiſtneſs, like Wool, as is upon Quinces, Willows, and other young Fruits and Trees, is drawn up of the Sun among the Vapors and Exhalations, which being clottered together, falleth down like locks of Wooll.

Quickſilver.

Quickſilver, all men know, with ſmall heat will be reſolved into moſt thin Vapors, whereof when quantity is drawn up, it falleth down again: As it is read, that once at *Rome* it rained Quickſilver, wherewith the Brazen Money being rubbed it looked like ſilver.

T. Livius. Chalk.

Titus Livius maketh mention that it rained chalk, whereof the cauſe cannot be hid to them that read how ſtone and brick come in the Air.

Iron

Iron hath alſo rained out of the clouds, and ſundry times, as Hiſtories witneſs, whereof this hath been the cauſe. The generall matter of all metals, which is quickſilver and brimſtone, with the ſpecial matter of mixtion that maketh Iron, were all drawn together, and there concocted into the metal: ſo came the ſtrange Rain of Iron. Iron.

Avicen ſaith he ſaw a piece of Iron that fell out of the clouds, that weighed about an hundred pound weight, whereof very good ſwords were afterwards made. Avicen.

Of Dew.

DEw is that Vapour which in Spring and Autumn is drawn up by the Sun in the day time, which becauſe it is not carried into the middle region of the Air, abiding in the lower region, by cold of the night is condenſed into water, and falleth down in very ſmall drops. Dew.

There is common Dew, and ſweet Dew.

One kind of ſweet Dew is called

Manna. Manna, being white like Sugar, which is made of thick and clammy Vapors, which maketh it so to fall thick and white. It falleth only in the East parts.

As for that Manna which God rained to the *Israelites*, it was altogether miraculous.

Plinius. Arabia. Ladanum. Cusus. In *Arabia* (as *Plinius* writeth) is very precious kind of Dew that is called *Ladanum*, which falling upon the herb *Cusus*, and mixed with the juyce of that herb which Goats do eat, is gathered off Goats hair, and kept for a treasure.

There is another kind of sweet Dew that falleth in *England*, called the Mildews, which is as sweet as honey, being of such substance as honey is: it is drawn out of sweet herbs and flowers.

Bitter dew. There is also a bitter kind of Dew that falleth upon herbs, and lieth on them like bran or meal, namely because it is of an Earthly Exhalation, and so remaineth when the moisture is drawn away: This Dew killeth herbs.

The

The common Dew drunk of Cattle doth rot them, because the matter is full of viscosity, bringing them to a fluxion.

There be three things that hinder Dew from falling; that is, great heat, great cold, and wind; for Dew falleth in the most temperate calm time.

Of Hoar-Frost.

HOar-frost, or white frost, is nothing else but dew congealed by overmuch cold. The South and East wind do cause dew, but the North and Northern winds do freeze the Vapors, and so it becometh hoar-frost; which if that excessive cold had not been, should have turned into dew. Hoar frost.

The dew and the hoar-frost agree in three things, namely, in matter, in quality of time, and place of the generation. In matter they agree, for they are both generated of a subtile and thin Vapor, and also small in quantity.

In quality of time they consent, for both are made in a quiet and calm time;

for if there were great wind, it would drive away the matter, and so could there be no generation.

Thirdly, they are both generated in the lowest Region of the Air; for (as Aristot. *Aristotle* affirmeth) upon the high hills there is neither dew nor hoar frost.

They differ also in three things. For the hoar frost is congealed before it be turned into water; so is not the dew.

Secondly, The dew is generated in temperate weather, the white frost in cold weather.

Last of all, hot Winds, as the South and East, do cause dew; but cold winds, as the North and West, do cause hoar frost.

Hoar frost doth often stink, because of the stinking matter whereof it consisteth, which is drawn out of lakes, and other muddy and stinking places.

Of Hail.

Hail. HAil is a hot Vapor in the middle Region of the Air, by the cold of that Region made thick into a cloud, which falling down to the sudden cold of

of the lowest Region, is congealed into Ice.

There be so many kinds of Hail, as there be of rain: The fashion of Hail is sometime round, which is a token that it was generated in the middle region of the Air, or very near it, for falling from high, the corners are worn away.

When the Hail stones are square, or three-cornered, the Hail was generated near the earth.

Oftentimes there is heard a great sound in the Cloud, as it were of Thunder before Hail, or of an Army fighting, &c. The cause is, That Vapors of contrary qualities being inclosed in the Cloud, do strive to break out, and make a noise, even as cold water doth, being put into a seething pot.

In Spring and Harvest-time is often Hail, seldom in Summer and Winter. In Winter there want hot Vapors, in Summer the lowest region is too hot to congeal the rain falling down. In Spring and Autumn there want neither hot Vapors to resist the cold, nor sufficient cold to harden the drops of that hot shower of rain.

The hail ſtones are ſometimes greater, and ſometimes leſſer; greater, with greater cold; and leſſer, with leſſer cold

There is ſeldom hail in the night, for want of hot vapors to be drawn up.

Sometime hail and rain fall together, when the latter end of the cloud, for want of cold in the loweſt region, is not congealed.

Hail ſtones are not ſo clear as Ice, becauſe they are made of groſs and earthy vapours, Ice is congealed of clear water.

Hail is ſooner reſolved into water, than Snow, becauſe it is of a more ſudden and ſwift generation.

Of Snow.

Snow.

SNow is a cold congealed by great cold, before it be perfectly reſolved from vapours into water.

Snow is white, not of the proper colour, but by receiving the light into it, and ſo many ſmall parts; as in ſome, or the white of an egg beaten.

Snow is often upon high hills, & lyeth long there, becauſe their tops are cold,

cold, as they be near to the middle Region of the Air; for oftentimes it raineth in the valley, when it ſnoweth on the Hills.

Snow melting on the high Hills, and after frozen again, becometh ſo hard, that it is a ſtone, and is called *Chryſtall.* Originall of Chriſtal

Other matter of Snow, becauſe they are common with Rain, are needleſs to be ſpoken of. To be ſhort, ſleet is generated even as Snow, but of leſs cold, or elſe beginneth to melt in the falling.

Snow cauſeth things growing to be fruitfull, and encreaſe, becauſe the cold driveth heat unto the roots, and ſo cheriſheth the plants.

Of Springs and Rivers.

THe generation of Springs is in the bowels of the Earth, and therefore ſomething muſt be ſaid of the body of the earth. The earth, though it be ſolid and maſſie, yet hath it many hollow gutters and veins, in which is alwayes air to avoid emptineſs: for the ignorant in Philoſophy muſt be admoniſhed,

ed, that all things are full, nothing is empty; for nature abhorreth emptineſs; ſo that where nothing elſe is, there is Air and Vapors, which by cold, as it hath often been ſaid, will be reſolved into drops, as we ſee experience in marble Pillars, and ſuch like hard ſtones toward rain.

Nothing is empty.

This Air and Vapors therefore being turned into drops of water, theſe drops ſweat out of the earth, and find ſome iſſue at the length, where many being gathered together, make great abundance of water, which is called a Fountain or Spring. The cauſe why ſuch Spings do run continually, is, becauſe that Air can never want in thoſe veins, which by cold will alwayes be turned into water, ſo that as faſt as the water runneth forth, ſo faſt is Air again received into the place, whereby it cometh to paſs, that ſo many Springs are perpetuall, and never dried: but if any be dried up, it is in a hot Summer, and ſuch Springs alſo they be, whoſe generation is not deep in the earth, and therefore the Vapors may be made dry, and the earth warm, ſo the Spring may fail. There

There be four kinds of ſprings; fountains, brooks, rivers, and lakes.

Of Fountains.

Fountains. FOuntains be ſmall ſprings, which ſerve for wells and conduits, when there is but one place where the Water is generated; and that is not very abundant, either becauſe it is of ſmall compaſs, or ſmall veins, and not many.

Of Brooks.

Brooks. BRooks, boorns, or fords, be ſmall ſtreams of Water, that run in a channell like a river. They are cauſed, when either the ſpring occupieth a great compaſs, or elſe two or three ſmall ſprings meet together in one channell.

Of Rivers.

Rivers. RIvers are cauſed by the meeting together not only of many ſprings, but alſo of many brooks & fords which

which being received in divers places as they pass, are at the length carried into the broad Sea for the most part. Howbeit some Rivers are swallowed up into the Earth, which perchance run into the Sea, by some secret and unknown channels: some Rivers there be that hide their heads under the Earth, and in another place, far off, break out again. They Write also, that some Rivers being swallowed up of the Earth in one Island, do run under the bottome of the Earth and Sea, and break forth in another Island. There be also many great Rivers, that run under the Earth in great Caves, which never break forth. *Aristotle* sheweth of ponds and lakes that be under the Earth. And *Seneca* speaketh of a pond that was found by such as digged in the Earth, with fishes in it, and they that did eat of them, died. As Eeles that be found in dark places, as Wells that have been dammed up, &c. are poison.

Aristot.

Seneca.

Of

Of Lakes.

LAkes are made by the meeting together of many Rivers, Brooks, and Springs, into one deep valley: whereof ſome are ſo great, that they have the name of the Seas, as the Lake called *Hircane*, or *Caſpian* Sea. Theſe Lakes ſometimes unlade themſelves into the Sea by ſmall Rivers, ſometimes by paſſages under the Earth. Lakes.

The cauſe of the ſwiftneſs of Rivers is double; for they are ſwift, either for the great abundance of waters, or elſe becauſe they run down from an hilly place, as the River *Rhene* falleth down from the top of wonderfull high hills.

Of hot Baths.

SOme waters that are generated and flow out of veins of Brimſtone, are ſenſibly warm, and ſome very hot, becauſe they run out of hot places. Theſe waters being alſo dryingby nature, are wholeſome for many infirmities, ſpecially breaking forth of ſcabs, &c. Such Hot Baths.

are

are the Baths in the West Countrey and St. *Anne* of *Buck-stones* well in the North part of *England*, and many other elsewhere.

Of the divers tastes that are perceived in Wells.

Tastes of waters.

FOr a generall reason; the waters receive their taste of that kind of earth thorow which they run, as thorow a strainer. Some salt, that run thorow salt veins of the earth: some sweet, that be well strained, or run thorow such minerals as be of sweet taste: some bitter, that flow out of such earth as is bitter by adustion, or otherwise.

Some sowr or sharp, like vinegar, which run thorow veins of Allom, Coperas, or such minerals. *Aristotle* writeth of a Well in *Sicilia*, whose water the Inhabitants used for Vinegar.

Aristotle. Well water used for Vinegar.

In *Bohemia* near to the City called *Bilon*, is a Well that the people used to drink of in the morning, in stead of burnt wine.

Bohemia.

And in divers places of *Germany*, be Springs that taste of such sharpness.

Some

Some have the taſte of Wine; as in *Paphlagonia* is a Well that maketh men drunk which drink thereof; which is, becauſe that water receiveth the fumoſity of Brimſtone and other Minerals, thorow which it runneth, and ſo filleth the brain as wine doth. Paphlagonia.

A recitall of ſuch Rivers and Springs as have marvellous effects, whereof no naturall cauſe can be aſſigned by moſt men, although ſome reaſon in a few may be found.

Litumnus, which maketh Oxen that drink of it white, is a River or Spring in *Italy*, *Propert. lib.* 3. This may be the quality of the water, very flegmatick. In *Boetia* is a River called *Melas*, that maketh ſheep black if they drink thereof. Marvellous waters. Clitumnus Propert. Boetia. Melas.

Seneca ſpeaketh of a River that maketh red hairs: Theſe two with the firſt may have ſome reaſon, that the quality of the reaſon may alter complexion, and ſo the colour of hairs may be changed, as we ſee in certain diſeaſes. Seneca.

In *Lybia* is a Spring, that at the Sun riſing Libia.

rising and setting is warm, at mid-day cold, and at mid-night very hot. This may be by the same reason that well-water is colder in Summer than it is in Winter. *Seneca* writeth, that there be Rivers whose waters are poyson: this may be naturally, the water running thorow poysonous Mineralls, taking much fume of them. Other Wells that make wood, and all things else that can be cast into them, stones, such wells be in *England*, the cause is great cold.

Seneca.

Another Well maketh men mad that drink thereof. This also may have as good reason, as that which maketh men drunk: As also that Well which maketh men forgetfull, by obstruction of the brain.

The same *Seneca* speaketh of a Water, that being drunk, provoketh unto lust and lechery. And why may not that quality be in a Water which is mixed with divers Minerals and kinds of earth, which is in herbs, roots, fruits, and liquors?

St. *Augustine* speaketh of a Well in *Egypt*, in which burning Torches are quenched, and being before quenched, are lighted.

St. Augustine.

A-

Among the *Garamants* is a Well so cold in the day, that no man can abide to drink of it: in the night so hot, that none can abide to feel it. Garamants

It is incredible that is written of a Well in *Sicilia*, whereof if Theeves did drink, they were made blind. Sicilia.

In *Idumea* was a Well that one quarter of a year was troubled and muddy, the next quarter bloody, the third green, and the fourth clear. Idumea.

Seneca writeth of another Well that was six hours full and running over, and six hours decreasing and empty: perchance because it ebbed and flowed with the Sea, or some great River that was near it. Seneca.

In the Hill *Anthracius* is said to be a Well, which when it is full, signifieth a fruitfull year: when it is scarce and empty, a barren and dear year. The sufficiency of moisture maketh fertility, as the want causeth the contrary. Anthracius.

Men say there is a River in *Hungary*, in which Iron is turned into Copper: which may well be, seeing Ink in which is but small Copperas, and artifi- Hungaria.

cially mixed of Iron, doth counterfeit Copper in colour. In this ſtream may be much Copperas, and that is naturally mixed.

Seneca. Theophraſtus. Both *Seneca* and *Theophraſtus* witneſs that waters there be, which within a certain ſpace, being drunk of ſheep, (as *Seneca* ſaith) or of birds (as *Theophraſtus* will have it) changeth their colours from black to white, and from white to black.

cruvius. cadia. onacri-s. *Vitruvius* writeth, that in *Arcadia* is a Water called *Nonacrius*, which no Veſſel of Silver, Braſs, or Iron, can hold, but it breaketh in pieces, and nothing but a Mules hoof will hold it and contain it.

Illyria. In *Illyria*, Garments that are holden over a moſt cold Well, are kindled and ſet on fire.

Andros. Bacchus. In the Iſle of *Andros*, where the Temple of *Bacchus* ſtood, is a Well, that the fifth day of January floweth wine.

Iſidore. *Iſidore* ſaith, there is a Well in *Italy*, that healeth the wounds of the eyes.

S Chios. In the Iſle of *Chios* is a Well that maketh men dull-witted that drink thereof.

There

There is another that cauſeth men to abhor luſt.

Lechnus, a Spring of *Arcadia*, is good againſt abortions. Lechnus.

In *Sicilia* are two Springs, of which one maketh a woman fruitfull, and the other barren. Sicilia.

In *Sardinia* be hot Wells that heal ſore eyes. Sardinia.

In an Iſle of *Pontus*, the River *Aſtares* overfloweth the fields, in which whatſoever ſheep be fed, do alwayes give black milk. Pontus. Aſtares.

In *Æthiopia* is a Lake whoſe water is like Oyl. Æthiopia.

Alſo many Springs of Oyl have broken forth of the Earth, which cometh of the viſcoſity or fatneſs of the ſame Earth.

The Lake *Clitory* in *Italy* maketh men that drink of it to abhor wine. Clitory.

The Lake *Pentaſium* (as *Solinus* ſaith) is deadly to Serpents, and wholſome to men. Pentaſium. Solinus.

Seneca writeth of certain Lakes that will bear men which cannot ſwim.

And that in *Syria* is a Lake in which bricks do ſwim, and no heavy thing will ſink. Syria.

Rhene. It is ſaid, that the River *Rhene* in *Germany* will drown baſtard Children that be caſt in it, but drive aland them that be lawfully begotten.

Hypanis. Sythia. The River in *Hypanis* in *Sythia*, every day brings forth little bladders, out of which flyes do come, that die that ſame night.

Matrona. *Matrona* the River of *Germany*, as the common people ſay, never paſſeth day, but he taketh ſome prey.

Of the Sea.

The Sea. THe Sea in this Treatiſe hath place as a mixed ſubſtance: for elſe the element of Waters being ſimple, were not here to be ſpoken of.

The Sea is the naturall place of the Waters, into which all Rivers and other Waters are received at the length.

The naturall place of the water. And here it is to be underſtood, that the very proper and naturall place of the water, were to cover all the Earth, for ſo be the elements placed: the Earth loweſt, and round about the Earth the Water, about the Water, the Air, and about the Air, the fire.

Gen. 1. But God the moſt mighty and wiſe creator

ator of all things, that the Earth might in some parts be inhabited of men and beasts, commanded the Waters to be gathered into one place, that the dry land might appear, and called the dry land Earth, and the gathering of Waters he called Seas.

In the Sea are these two things to be considered; the saltness, and the ebbing and flowing.

Of the saltness of the Sea.

THe saltness of the Sea, according to *Aristotles* mind, is caused by the Sun, that draweth from it all thin and sweet *Vapors* to make rain, leaving the rest as the setling or bottom, which is salt. But men of our time, peradventure more truely, do not take this for the only and sufficient cause, to make so great a quantity of water salt, but say, that the Sea by Gods wisdom is gathered into such valleys of the Earth, as were otherwise barren and unfruitfull; such Earths are salt, the Sea Water then mixed with that Earth must needs be salt; else Rivers by *Aristotles* Aristot.

ſtotles mind, ſhould be ſalt as well as the Sea. The Reader may chooſe which opinion is moſt probable.

Of the ebbing and flowing.

Ebbing & flowing. Ariſtot.

THe ebbing and flowing of the Sea, as *Ariſtotle* ſeemeth to teach, is by reaſon of *Exhalations* that be under the Water, which driveth it to and fro, according to contrary bounds and limits, as upward and downward, wide and narrow, deep and ſhallow. This opinion of *Ariſtotle* alſo, as more ſubtile than true, experience teacheth men to miſlike, and to aſcribe the cauſe of ebbing and flowing to the courſe of the Moon, which ruleth over moiſture, as the Sun doth over heat: for from the new Moon to the full, all humors do encreaſe; and from the full to the new Moon decreaſe again. Alſo, the very true time of the ebbing and flowing may be known by the courſe of the Moon, with whom, as the Lady of moiſture, we will cloſe up the fourth Book, of moiſt and watery impreſſions.

The

The Fifth Book.

Of earthly Meteors, or bodies perfectly mixed.

His laſt Treatiſe containeth ſuch bodies whoſe chief matter is the earth, & are called perfectly mixed, becauſe they are not eaſily reſolved into the chief matter whereof they are generated. Theſe are divided into four kinds. The firſt be divers ſorts of Earth: The ſecond be Liquors concrete: The third be Metalls and Metallikes: The fourth be Stones. Earthly bodies.

This diviſion is not altogether perfect, both for that there be many of theſe Minerals which partake of two kinds, and alſo for that the names of theſe kinds may be ſaid of others. Yet minding as plainly as can be to declare the things themſelves; the controverſie and cavillation of names ſhall not greatly trouble us, eſpecially ſeeing we pretend not to teach Philoſophers, but ſuch as need a ruder and plainer inſtruction:

ſtruction. They may therefore be content with this diviſion, which ſhall not ſerve them to diſpute of theſe matters, but to underſtand the truth of theſe things that they deſire. Of theſe four thereforewe will ſpeak orderlyand generally, not minding to treat of every particular kind (for that were infinite) but to open ſuch univerſall cauſes, as they which have wit may learn (if they liſt) to apply unto all particulars.

Of Earths.

Of Earths. THe Earth is an element, one of the four, cold and dry, moſt groſs and ſolid, moſt heavy & weighty, the loweſt of all other in place. When I ſay an Element, I mean a ſimple body uncompounded. This Earth is no Meteor, but as it was ſhewed in the water, to the end there ſhould be generation of things. There is no Element that we have which is pure and ſimple, but all are mixed and compound. Our fire is groſs and compound, ſo is our air, our water, and our earth: but the earth notably and above the reſt, is mixed.

For

For the pure and naturall Earth is dry and cold; but we ſee much to be moiſt, and much to be hot. The natural earth is black of colour: but we ſee many Earths white, many yellow, and many red. So that firſt the greateſt part of the Earth is mixed with water, that maketh it to cleave together with air and ſome fire, which make an oyly, fat, or clammy earth, as is clay made, &c.

Another great part is dried, not into the naturall drineſs of the firſt quality, but as a thing once mixed, and after dryed, either by cold, as ſand, gravell, &c. or elſe by heat, as chalk, oker, &c. And yet ſomewhat more plainly and particularly to diſcourſe upon theſe cauſes, admitting the natural colour of the Earth to be black, of the water to be blew, of the air to be white, and of the fire to be ruddy, it followeth, that upon the mixtion of theſe colours, or chief domination of them, all things have their colour.

The groſs ſubſtance of the Earth therefore being diverſly mixed with other Elements, and thoſe mixtures again being eftſoons altered by divers and

and ſometime contrary qualities, hath brought forth ſo many kinds of earth, as clay, marble, chalk, ſand, gravell, &c. Clay is mixed with fat moiſture, taking his colour of the mixture with red from white; but being cold, it is not ſo fruitfull as Marble, which is not alwayes ſo moiſt as it. Chalk is an Earth by heat concocted after divers mixtions, and dried up. Oker, both yellow and red, with ſuch like, are of the ſame nature, with mixtion of red, more or leſs.

Sand and gravell are dried Earths, as it were frozen by cold: gravell is groſs and apparent; ſand though it be finer, is of the ſame generation, conſiſting of many ſmall bodies, which are congealed into ſtones. Sand ſeemeth to be clay dried by cold, and clotted together into ſmall ſtones; whereof ſome are thorow-ſhining, which were the moiſt parts, the thick were of the groſs part: the ſame is gravell, but of greater ſtones conſiſting. The like judgment is to be given of all other kinds of Earth, whoſe generation by the ſimilitude of theſe will not very hard

to

to find out. They that list to know the divers kinds of Earths, must have recourse to *Plinius*, *Cardanus*, and other Writers, that recite a great number of them: but these are the chief and most common kinds. Plinius. Cardanus.

Of Liquors concrete.

WE take not Liquors concrete so largely as the word doth signifie, for then should we comprehend both the other kinds following. But only those liquors, called in Latine *Succi*, which are at it were middle between metals and stone, of which, some being fat and oily, do burn as Brimstone, Sea-coles, Jet, *Bitumen*, &c. and the kinds of all these. Other some do not burn, as Salt, Allum, Copperas, Saltpeter, &c. and the kinds of these.

Of the first sort which are generated of Earthy and Airy Vapors, Fumes and *Exhalations*, the chief and most notable is Brimstone, which seemeth to be the matter of all dry and hot qualities that are in Earthly *Meteors*. The rest are generated of such like Vapors

Vapors as Brimſtone is, but then they be diverſly mixed: as the coals have much Earth mixed with Brimſtone; Jet ſeemeth to be all one, but better concocted than coals. Of Amber is great contention, whether it be a minerall, or the ſperm of a Whale: for it is found in the Sea, caſt upon the ſhore. Now the Whales ſeed being of the very ſame qualities, is taken more and leſs concrete of divers hardneſs; ſome almoſt as hard as Amber: ſome ſofter, and ſome liquid; yet *Cardan* plainly defineth, that Amber is a Mineral. Whether he have reaſon or experience, contrary to the vulgar opinion, let them conſider that liſt to contend. Theſe Minerals that will reſolve with fire, it is apparent that they were concrete with cold: in that they burnt, it is manifeſt they have a fat and clammy ſubſtance mixed with them, as the other kind hath not, which will not reſolve ſo well with fire as with Water; which be ſalt, copperas, ſaltpeters, &c. Theſe burn not, being watery, earthy, and not fat, unctuous, nor clammy.

Theſe be of divers colours, black, as Coals,

Coals, and Jet, becauſe there is much Earthy ſubſtance mixed with their ſulphurous matter. Some be ſheer, as Salt, and Allum, having a ſubſtance Watery dryed, and concrete. Copperas is green, becauſe it hath much cold matter that is blew mixed with it. Salt, the moſt common and neceſſary of all theſe liquors concrete, that be moiſt and not fatty, hath two manner of generations; one natural, and the other artificial. The natural generation is when it is firſt generated in the Earth; after cometh the water of the Sea, and is infected with it; out of which the Salt is again artificially gathered. Of theſe liquors concrete, be thoſe ſtrange wels and ſprings infected, of which was ſpoken in the latter end of the fourth Book. Moſt notably Brimſtone cauſeth the hot Baths, and burneth in *Ætna* of *Sicilia*, and *Veſuvius* of *Italy*, caſting up the Pumice ſtones, of which is no place here to treat. Ætna and Veſuvius.

Of

Of Metals.

Metals. METals be ſubſtances perfectly mixed, that will melt with heat, and be brought into all manner of faſhions that a man will.

Of theſe the Alchymiſts ſay there be ſeven kinds to anſwer to the ſeven Planets; Gold, Silver, Copper, Tinne, Lead, Iron, and Quickſilver, that Mercury. they call Mercury. But ſaving their Authority, Quickſilver is no more a Metal than Brimſtone, which is as neceſſary to the generation of Metal as Quickſilver is. For they all agree, that all Metals are generated of Sulphur, that is Brimſtone, which becauſe it is hot they call the father; and Mercury, that is Quickſilver, which becauſe it is moiſt, they call the mother: ſo by as good reaſon may they call Brimſtone a Metal as Mercury.

Then there remaineth but ſix perfect Metals; Gold, Silver, Copper, Tinne, Lead, and Iron.

Of Gold.

THat moſt unprofitable and hurtfull of all Metalls, Gold which moſt men diſpraiſe, and yet all men would have, is of all other Metalls the rareſt: it is only perfect, the reſt are corruptible. Gold.

Gold never corrupteth by ruſt, becauſe it is pure from poyſonous infection, and moſt ſolid, that it receiveth not the Air into it, which cauſeth all things to corrupt. It is perfectly concocted with ſufficient heat and mixture of Sulphur: all other Metals either are not ſo well concocted, or elſe they have not the due quantity of Brimſtone. Why Gold ruſteth not

This opinion hath alſo place among the Alchymiſts, that becauſe Nature in all her Works ſeeketh the beſt End, ſhe intendeth of all Metals to make Gold; but being let, either for want of good mixture, or good concoction, ſhe bringeth forth other Metals, indeed not ſo precious, but much more profitable; and the leſs precious, the more profitable: The opinion of the Alchymiſts

table: for there is more use to the neceſſities of mans life in Iron and Lead, than in Gold and Silver; but either the beauty, or the perfection, or at leaſt the rareneſs of Gold and Silver, have obtained the eſtimation of all men, ſo that for them is ſold all manner of things, holy and profane, bodily and ſpiritual.

What pains do not men take to win Gold? Every man hath one way or other to hunt after it: but the Alchymiſt deſpiſing all other ways as ſlow, unnatural, and unprofitable, laboureth either to help Nature in her work, as of unperfect Metals to make perfect, or elſe to force Nature to his purpoſe by his Quinteſſences and Elixars, ſo that what by purging, what by concocting, what by mixing of Sulphur and Quick-ſilver, and much other like ſtuff, at length he turneth the wrong ſide of his gown outward, all the teeth out of his head, and his body from health to a Palſey, and then he is a Philoſopher, and ſo he will be called.

Of Silver.

Silver, the moſt pure Metal next unto Gold, hath indifferent good concoction in the Earth, but it wanteth ſufficient heat in the mixture, that maketh it pale. Silver.

It is found (as they ſay) running into divers veins, as all other Metals be, but this moſt ſpecially, after the ſhape and faſhion of a tree lying along, with a body or ſtock, of proportion like to the body of a tree, alſo with arms, branches, leaves, and fruits.

This Metal Silver lacketh ſufficient heat, and therefore cometh neither to the colour, ſolidity, nor perfection of Gold, and is generated in cold Countries, near unto the North and South Poles, in ſo great quantity, that the Husbandmen when they plow their ground, turn up ſilver among the clods in their daily labours, which they do hide and conceal, leſt the greedy Princes for covetouſneſs of the Metal, ſhould overturn and deſtroy their land.

The Gold Mines are contrariwiſe moſt found in the hot Countries of *India* and *Æthiopia*, becauſe in them is ſufficient of heat for that unhappy generation.

This Silver alſo the Alchymiſts would fain make by Art; but Mercury the chief Maſter of the Work, is ſo ſubtile and ſo ſly, that nothing can hold him, nothing can kill him: for if the glaſs be not very thick, he will ſoon break out of priſon, and ſo there is nothing left.

Of Copper.

COpper in colour coming neareſt to Gold, being not ſo ſolid nor maſſy, (for of all Metal Gold is the heavieſt) giveth way to corruption, being infected with that green Mineral Copperas.

Hereof be divers kinds, Braſs, Latin, and ſuch like, which differ in digeſtion; the Copper being pureſt, is of beſt digeſtion, and neareſt unto Gold: and ſo the reſt in like degrees.

Copper is moſt like Silver in the weight

weight and in the hammering: wherefore the Alchymists have learned to make it white, that it deceiveth mens sight and handling: but the Goldsmiths do easily try it, and by the taste of counterfeit Silver make Copper again.

Copper or Brass doth alwayes grow near to the Mine of Copperas, which running with it in the digestion or natural concoction, hindereth it of perfection, maketh it to stink, and to be eaten of a green rust.

Much ado the Alchymists have to turn it into Gold, if it might be: they dispute very reasonably, and conclude almost necessarily in their Talk, that it may be converted into Gold, as a body that wanteth little of perfection, which may be easily added unto it: but in conclusion of the work, it is an harder matter to bring to pass, than it was to purpose, before they had done it, to build an Abbey at every miles end upon *Salisbury* Plain, as one was minded.

Of Tin.

Tin. TIn, whereof great plenty groweth in the Weſt parts of *England*, in beauty and colour cometh neareſt to Silver, and of Silver wanteth nothing but ſolidity and hardneſs: for Tin is a raw and undigeſted metal, alſo very poroſe and compact, which cauſeth it to craſh when it is broken or bitten: ſo it faileth of heat in the commixtion, and alſo ſufficient digeſtion in the Earth: otherwiſe it is a fair and profitable metal, to ſerve the uſe of them unto whom Silver and Gold are not ſo plentifull.

Of Lead.

Lead. LEad, alſo found in great abundance within this Realm, is a raw and undigeſted metal as Tin is, but yet of better digeſtion than commixtion: for it is mixed with a groſs earthy ſubſtance, which maketh it to be in colour ſo black and ſo foul to corrupt: ſo that of the ſame Fumes and Exha-

Exhalations (which if they had been pure and well digested, if the place and matter would have suffered, should have been concrete into Silver) for lack of the same Lead is generated, which coming plentifully, doth better service than Silver.

Of Iron.

IRon, the most necessary and profitable of all other metals (and yet as ill used of many as any other) is generated of such substance as Silver is, but mixed with a red Mineral, which eateth it with red rust, and also being of too extream digestion, passing all other metals in hardness. And as other metals to the perfection of Silver want sufficient concoction, whereby they come not to the same hardness: so Iron passeth and exceedeth Silver in immoderate digestion. But though it come not to the perfection of Silver, God forbid that all Iron had been turned into Silver: for then we should more have missed it than silver or gold the want of which would hinder us nothing at all. Iron.

Of Quick-silver.

Quick-silver.

THough Quick-silver be no metal, yet because it is the mother of all metals, something is here to be spoken of it.

There be divers and sundry opinions, both of the generation, and also the qualities of it, which make the generation hard to find out. For if the quality were certainly agreed upon, there were an easier way found to try out the generation.

Some affirm that it is exceeding hot, and that they would prove by the swift piercing thereof into other things that be porose.

Others say it is exceeding cold, and that they prove by the exceeding weight of it. As for the piercing, they say it is caused of the exceeding moistness, of which quality both parts do grant that it is. Concerning the generation, some have said that it is pure and Elemental water; some again have thought that it droppeth out of heaven, and is a part of the heavenly sub-

ſtance. And others ſay that it is generated in the Clouds, and falleth down in the fields in a Circle, on thoſe round Circles which are ſeen in many fields, that ignorant people affirm to be the rings of the Fairies dances.

It is certain that Quick-ſilver hath divers times fallen out of the Clouds, as we have declared in the Treatiſe of Wonderfull and Marvellous Rain: but whether it ſo fall in Circles it is doubtfull. The moſt probable opinion is, that it is generated of moiſt *Vapors* of the Earth, coacted by cold, much like to Water, as Brimſtone is of hot fumes coacted by cold, much like to fire. And thus much of metals.

Of Stones.

STones, the fourth kind of Earthly mixed bodies, have two manner of generations, by moſt contrary qualities, for heat doth harden moiſt bodies into ſtones; and we ſee that clay it maketh exceeding hard Brick. Stones.

Alſo the Thunderbolts in the clouds

are generated by heat, as before hath been ſhewed. But cold doth by congealing generate many more ſtones than heat doth; for the moſt part of all the ſtones that are digged out of the Earth, are generated by cold, which is able to convert any other kind of mixed ſubſtance into ſtone, as hath been partly ſhewed in the nature of wels and ſprings, of which there be ſome in *England*, which by their cold turn wood, or any like thing, into ſtones. I have ſeen a piece of rotten wood, which to ſight was very light, and like wood, but in handling, a very ſtone that was taken out of ſuch a Wel. Alſo of other things taken out of the Earth, turned into ſtones; I have ſeen and found my ſelf, flyes, with head and wings, very hard ſtones; alſo I have ſeen a heart, a birds tongue, a beaſts ſtone, a pear, a plumme, and divers other things, turned into hard ſtones.

Of

Of divers kinds of Stones.

STones may first be divided into rude and beautifull: the rude contain those great Rocks which are generated by many small parts, joyned together, & the common pebble stones that be found every where in the Earth, among gravell, and on the shore of the Sea, or banks of the Rivers. These are generated of gross and earthly humours, congealed by cold: and because they be neither fair of colour, nor thorow shining, and also common, they are contemptible. The fair or beautifull stones be either great or small. The great be as marble of divers kinds and colours, alablaster, and such like, which being hard and well concocted, may be polished and become beautifull. Their colour is as they are mixed, being uncongealed, so is their pureness. The small are more precious, and they be either thick or pellucide. The thick be neither so fair nor so precious, as the *Achates*, the *Jasper*, *Prassios*, &c. These consisting of a pure mat-

Rocks.
Pebble stones.
Marble.
Achates.
Jasper.
Prassios.

matter, and not very watery, are congealed into ſuch ſtones. The clear ſtones be liquors concrete, as the *Diamond*, the *Saphir*, the *Emerald*, &c. they are praiſed for their greatneſs, hardneſs, clearneſs, and fair colours, of which enough hath been ſpoken, ſaving that ſome be of opinion, that theſe be generated by heat, becauſe the beſt are found in hot countries, in the Eaſt, and in the South. Anſwer may be made, that the hotter the Air is, the colder is the earth: ſo that reaſon is of ſmall force.

Diamond. Saphir. Emerald. The praiſe of precious Stones.

Of the vertue of Stones.

The vertue of Stones.

SOme perchance would look that we ſhould make a long diſcourſe of the vertue of ſtones, and would be well content that we ſhould treat of divers properties of gemms and precious ſtones, which matter though it be out of our purpoſe (which conſidereth only the generation) yet ſeeing it is not out of their expectation, ſome thing briefly, and yet ſufficiently ſhall be ſaid of the vertue of ſtones.

That vertue that is aſcribed unto them,

them, is either Natural or Magical. Natural vertue is either that which is known to have a natural cauſe, or a natural effect, as the *Magnes* or Loadſtone to draw Iron, which is by a ſimilitude of nature, & ſuch an appetite as is between the Male and the Female. Alſo the ſaid *Magnes* moveth toward the North, and as ſome ſay, there is another kind found in the South, that draweth toward the South. They ſay, that there are great hills of this ſtone in the North and South, which maketh it look that way.

The vertue of Stones, either naturall or magicall. Magnes.

Others bring a Mathematical reaſon, which becauſe it is more curious than can be underſtood of the common ſort, not exerciſed in Geometry, I omit.

The Jet and Amber draw hairs, chaff, and like light matter, but being before chafed, for heat is attractive.

Jet and Amber draweth chaff.

Alſo the precious Stone called *Aſtroites*, moveth it ſelf in Vinegar, the ſharpneſs of the Vinegar piercing it, and the air excluded driving it forward.

Aſtroites, a Stone moveth in vinegar.

Theſe vertues becauſe I have ſeen, I have ſet for an example; generally all other

other like natural vertues, proceed of like natural causes, which by their effect, the ingenious must seek to find out

As for Magical Vertues, they be they which are grounded on no reason, or natural cause; which if they take effect, it is rather of the superstition and credulity of him that useth them, than of the vertue of the stones. As that an Emerald encreaseth love, a Saphir favour, a Diamond strength, and such like vertues, of which *Albertus*, in his Age surnamed the Great, took pains to write a Book, which I suppose to be Englished.

Albertus Magnus.

To conclude with the cause why Stones melt not, as Metals do, may be gathered by that which hath been said before, because they are congealed past that degree, and also because there is left in them no unctuous or clammy matter. Let this suffice for Stones; and so the whole purpose is at an end.

Ob-

OBSERVATIONS ON *Dr. F.* his BOOK OF

Meteors.

By *F. VV.*

LONDON,
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CHAP. I.

Of the Earth.

IT is a great Queſtion amongſt Philoſophers, whether the External and Viſible Riches and Plenty which groweth and ſpringeth on the face of the Earth: or the Internal and Hidden Treaſure be more precious and valuable?

Flowers and Fruits, Corn and Cattel, and all other external terreſtrial Births are of moſt rare and exquiſite uſe for mankind: but the Earth is an Element not only beautified without, but moſt richly ſtored within with great Varieties of admirable Creatures, both pleaſant, rare, and profitable, for humane Content and Conſervation.

From

* Ils l'appelloient la mere grand & la mere de dieux. Antoine du verdier En la Religions de Pagens.

From this very Conſideration the Philoſophers of old reckoned and eſteemed the Earth as the firſt and moſt ancient of all the Gods, and ſo ſtiled her * The Grandmother or Mother of all the Gods. And the Heathens did not only honour the Earth as a Mother, but did adore her as a Goddeſs, giving her the names of *Ops*, *Cibele*, *Rhea*, *Proſerpina*, *Veſta*, *Ceres*, and other Appellations, to ſignifie the diverſities, and ſeveral effects, and vertues, which ſhe produced.

Ops.

The Earth was called *Ops*, which ſignifyeth *Aid*, becauſe ſhe affordeth aid and comfort to all Creatures inhabitant on her: And *Pauſanias* reports, that near the River *Craſſide* in *Greece*, there ſtood a little Temple dedicated to the Earth, wherein ſhe was adored, *Dea largi pectoris*, as the Goddeſs of the open and large breſt, freely feeding all her Children, which in numerous companies were ranged by her.

Her Robe was rich and glorious, embroidered with the moſt pleaſant flowers of all colours: and ſhe was adorn'd with a Mantle of Tiſſue, whoſe ground

ground was a beautifull Green, ſignifying her great Plenty of all things, wherewith Mankind might be affected, as moſt valuable and precious; and ſuch are her rich Mines of Gold, Silver, Copper, Braſs, and Iron: or yet more highly priz'd Commodities, as precious Stones, and rare rich Gems of all kinds.

CHAP. 2.

Of Metals.

THe viſible beauty of the Earth is obvious to everyeye, which is not the Subject here in hand; Her abſtruſe and hidden riches, *Preciоſa periculа terrа*, as *Boetius* calls them; her precious Metals and Mines, which force men to be ſo bold and ingenious, are the matter of this Diſcourſe: Theſe *Ariſtotle* calls *Corpora perfectè mixta*, inanimate bodies of compleat mixture, made up of Sulphur and Quick-ſilver, the veins of the Earth being compoſed of a fit temper for ſuch production; Some Philoſophers make the Ety-

mon of *Metallum*, from μεταλλεῦν, which ſignifies a change effected in the Subterranean Veins, with long labour and much difficulty.

Some Naturaliſts are more ſhort, and ſeem more plain; affirming, That Metals is that which is plyable by the hammer, and hard: Stones are hard, but not plyable, and Wax and Mud are plyable, but not hard.

CHAP. 3.

Of the number of Metals.

METals are ſeven in number, as the Planets are; Gold, Silver, Amber, Iron, Lead, Braſs, Copper. Gold preſenteth the Sun, Silver the Moon, Amber, called Electrum, Mercury, Iron Mars, Lead Saturn, Braſs Venus, and Copper Jupiter; or elſe the ſeven may be diſtinguiſhed thus: All Metal is perfect, ſoft, and pure, as Gold; or it is pure and hard as Silver; or it is hard and impure as Iron; or it is ſoft and impure as Lead: And for Amber, it is compounded of Gold and Silver, as

Cyprus

Cyprus Copper is made of Braſs and Iron, containing an equall ſubſtance of Braſs and Iron, which cauſeth that too much concocted, and high tincted, is eaſily changed into Braſs, and re-changed again into Copper.

CHAP. 4.

Of Gold.

GOld is *Metallum puriſſimum*, the pureſt Metal of all others; and nature never took delight to make a more perfect elementary ſubſtance than Gold is; and therefore in price and eſtimation is far above all other riches.

The compoſition of Gold is proportioned in equall quality, fitly correſpondent in the ſymmetry of the elements which compound it; it is even in the Originals ſo purified already, as are the ſimple & pure Elments, in ſuch ſort, that by their conjunction together in equal power, there is engendred ſo delicate and perfect a mixture of indiſſoluble union, compoſing an accord ſo faithfully, that there is made there-

by an incorruptible Paſte, which is permanent to all eternity, in the excellency and goodneſs thereof; wherefore Gold cannot be vanquiſhed by injury of time and antiquity; neither can contain in it ſelf, nor ſupport any excreſcency and ſuperfluity of Ruſt; for though it be put into the water or fire, and there remain a long ſpace; yet it is never ſtained, nor accepteth it any other quality but what is natural. Nor yet doth Gold fail any whit, which is a ſole priviledge belonging to this Royal Metal, all other being ſubject to alteration and corruption; for though Gold be drawn into the ſmalleſt wire, and be extenuated as fine as the threds in the Spiders web, and though it be buried in the moſt piercing medicaments, as are Sublimatum, Verdigreaſe, Salt, Vinegar, and that it remain three thouſand years therein, it will not for all that be corrupted, but rather the more refined, provided the Gold be perfect, and not ſophiſticated and falſe.

CHAP.

CHAP. 5.

Where Gold is found.

GOld is found in divers manners, to wit, mixt with Sand, as in *Bohemia*: on the ſhore-ſide amongſt the water, near to *Goldborough* & *Riſegrond*; and amongſt the ſtones in mountains, as in *Calecut*, and in the *Indies*.

The generation of Gold is uſually on the tops of Mountains, becauſe that there in the higheſt places, the Sun doth more eaſily purifie that which retaineth too much earthineſs in it: and when the Rain and Torrents do flow down, they carry the Gold down with them to the foot thereof, where it is gathered amongſt the ſand, or elſe in waters near thereunto, whither it is driven by the violence of floods, except the Ground perhaps open with thoſe inundations, and the Gold fall into the gaping jaws of the Earth, and ſo ſtick there. Now it is obſervable, that that which is found in the entrance of the Mine, is not the pureſt, but is as an earneſt to invite to farther la-

sour and pains. That which is found in Waters and Rivers is fished for, and is in form of little Grains: In Rocks and Mountains it is taken out by delving and digging. And there be three sorts of Mines, some are called Pendent, some Jacent, and some Oblique and turning: Pendent are those which are found in the superficies, and tops of Mountains: Jacent are low, and lie in plain fields: Oblique have a cross course, whether it be to that which is Pendent, or Jacent, all whereof is driven by Rivers into the next floods.

CHAP. 6.

Of Silver.

THe most noble among Metals next to Gold, is Silver; for though Copper in colour, and Lead in weight, do nearest approach unto Gold, yet in tenuity of substance, in pureness and fastness, Silver is so like unto it, that good Silver may be rightly said to be imperfect Gold in substance, failing in colour, and that by succession of time, it is sometimes changed into Gold, as

in

in many years ſpace Lead turneth into Silver. The Mines of Silver are more ordinary than Mines of Gold; and it is uſually engendred in four manners, to wit, either in the Earth, or in Braſs, or in Lead, or in Stones, which being purged and melted, yeeld ſome quantity of Silver. In the Mountain called *Mons Regius*, ſtones retain very much Silver, which being put in the fire, there is found in every pound of Silver that runneth out of them, half an ounce of Gold at leaſt.

Silver is many times found to be mixed with Copper, as in *Alſatia*, near to the *Rhine* in the Mountains of S. *Ann*, and in *Meſſein*. When Silver is ſeparated from Lead, it leaveth a ſcum which is called *Lythargyrium*, which is a kind of impure Lead.

CHAP. 7.

Of Quick-ſilver.

Quick-ſilver is called *Materia Metallorum*, the matter of the Metals, and though it have the name of Silver, yet in nature it approacheth nearer to

Gold; for it is like unto it in tenuity and weight, and to Silver only in colour. And notwithstanding the opinions of many *Chymists*, Quick-silver is not a Metal, but a Water condensate, not by heat (for it is not hardned) nor by cold (for then it would be a stone or metal) but by some other terrestrial rare and pure portion, whereby it cometh to be weighty and cold, splendent and liquid, and is therefore ranked amongst those metalline substances, which differ but little from water, and it is common in experience, that the Mountains wherein Quick-silver is found, are very green and full of fountains.

CHAP. 8.

Of Electrum or Amber.

MAny Authors, Philosophers, and Chymists, disagree in their opinions and discourse of Amber; some reckon Amber amongst plyable and hard metalline substances; others will not acknowledge it but to be but the gum of a Tree, producing Rosin, which is common in *Arabia*.

Philo-

Philemon writeth, that in two places of *Scythia*, Amber is digged out of the ground like a kind of ſtone, and in one place it is white, and in another it is yellow; to omit this Argument, and to agree with thoſe who allow Amber to be a Metal, is moſt conſonant to reaſon: The nature and property of it is a mean betwixt Gold and Silver, and ſuch is the true and natural Amber; as for that which is uſed for Beads, it is but artificial.

Amber partaketh more of Gold than Silver, becauſe it is more pure, & more apt to be wrought; for if it conſiſt more of Silver, it could not endure the forge and hammer.

Veſſels are made of Amber, ſome for beauty, ſome for profit: and if compoſed of true and good Amber, they will diſcover poyſons by cracking, and making ſigns of an Arch within: for when the rare humidity thereof cometh to be conſumed by the force of venome, it cracketh, and the colour changing in the Veſſel, it ſeemeth in ſtead of the great ſplendor thereof, there doth a kind of ſtain repreſent it

ſelf

self like unto an Arch. Now that this Metal is more rare, is ignorance, that knoweth not the vertue; or avarice, that greedily thirsteth after Gold and gain.

CHAP. 9.

Of Iron.

IRon is taken out of the Earth, and to make it Malleable, the mass thereof is laid to dry in the Sun, and that which is earthy, doth soften and moulder with the Rain, as that which is moist doth melt with the Sun; which as the venome of it is consumed in the Furnace by the fire, by how much more it is purged in the fire, by so much the more it is pure in its goodness, in such sort as that which is earthy doth at last turn to shales and dross, and the most subtile part thereof doth convert into Steel.

CHAP. 10.

Of Steel.

THe common Steel is artificiall extracted Iron, Iron more excellently

lently purged, and a little Marble added thereunto; but in many places there is Natural Steel, namely in *Perſia* very good, and in the *Chaldean* Iſle, and near *Damaſcus*, whereof the beſt Cemiters and Faulchions in the world are made, which cut ſo well, that there is no Raſor, be it never ſo well ſteeled and tempered, that hath a more keen and ſharper edge; for this cauſe ſome ſay, That there are ſome kinds of Steel and Iron ſo excellent, that weight for weight, they are eſteemed of greater price than Gold.

CHAP. 11.

Of Lead.

LEad is a groſs, dull Metal, Procreated and Conſiſtent of more impure Quickſilver, and more feculent and craſs Sulphur; it leaſt endures the fire of any Metal, and therefore ſooneſt melteth. *Galen* ſaith, Lead buried long in moiſt ſubterranean caves and holes, encreaſeth in magnitude and weight, and therefore is a Cover (if wel conſidered) leſs proper for any buildings;

dings, but where the Roofs are of infinite strength: There be diverskinds of Lead, some red, somewhite, someblack, and a fourth sort of a mean quality betwixt white and black, found in the mountains of *Bohemia*. The Ore of Lead is melted in furnaces, and is let run through pipes out of the furnace, whither the Workmen will. Lead is an incongruent and malignantMetal to all others; and if but one ounce be mixt, incorporated with one hundred ounces of Silver or Gold, the mixture will render the whole mass brittle and fragil; and so it will be in all like proportions.

CHAP. 12.

Of Tin.

TIn is a white Metal, somewhat like to Silver for its splendor & whiteness, and yet not much above Lead for its softness and porosity. And this is the difference betwixt Tin and whiteLead, that the one is engendered where there is some Silver mine or vein, but the

the other is generated apart, without the company of ſo rich a Neighbour.

CHAP. 13.

Of Braſs.

BRaſs is a more impure Metal, which compoſed of much ſulphurous matter, is more hot, light, and leſs pory, and ſo leſs ſubject to corruption and ruſt, by reaſon of all moiſture and humidity (almoſt) conſumed in it.

In times paſt, it was very uſuall to make Shields and Bucklers, and Pikes, & Launces thereof, as *Homer* reports how *Menelaus* purſued *Paris* with a brazen Launce. This Metal is proper for Trumpets, becauſe it maketh a great noiſe in Dorick muſick, and enflameth men to Combat: That of Cyprus is harder, and therefore better than any other.

CHAP. 14.

Of Copper.

COpper, or Orichalcum, is Latin, or as ſome call it *aes factitium*, artificial braſs; it repreſents with it a golden Com-

Complexion, but is ſomewhat more yellow than Gold; ſome becauſe of Copper make two kinds of Braſs, the one Natural, the other Artificial; the beſt hath ſpots of ſhining Gold intermingled; and the Merchants tell us, that in *Nova Hiſpania* in *America*, a piece of it hath been found of two hundred pound weight. The Artificial bras, commonly called Copper or Latin, is very ordinary; and the moſt excellent is that, which in four pounds of braſs doth contain in it one pound of white Lead. Alſo when the white Lead is mixed to the eight part of braſs, then is the Copper very good; but it is baſe when mixed with black Lead: the uſe of Copper is chiefly for fair inſtruments, as Ordnance, Cauldrons, and ſuch like, wherein it is more excellent than bras; and it giveth no ill taſte or ſmell to meat boyled in it.

FINIS.

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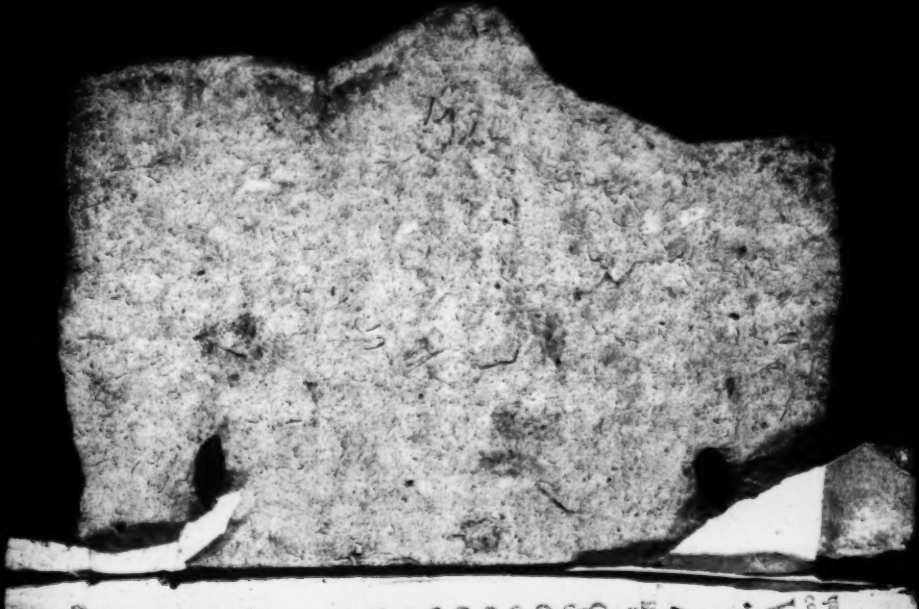
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